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PLEASE NOTE

This report presents unevaluated information extracted from publications of the USSR, Eastern Europe, and China. The information selected is intended to indicate current scientific developments and activities in the USSR, in the Sino-Soviet Orbit countries, and in Yugoslavia, and is disseminated as an aid to United States Government research.

SCIENTIFIC INFORMATION REPORT

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NOTE: Items in this report are numbered consecutively.

I. BIOLOGY

Radiobiology

1. Dangers of Radioactivity Resulting From Continuous Testing of Atomic Bombs Studied

"On the Radioactive Danger From Continuous Tests of Atomic Bombs," by O. I. Leypunskiy; Moscow, Atomnaya Energiya, Vol 4, No 1, Jan 58, pp 63-70

The danger from settling of radioactive fallout over the entire world as a result of the continuous test explosions of atomic bombs, equivalent in intensity to 11 megatons of TNT per year, is examined. The concentration of strontium-90 in the bones, the incidence of leukosis, and the number of genetic victims is computed. Computations show that by the end of the century, the concentration of strontium-90 may exceed the official maximum permissible dose in large segments of the population, and each additional year of continuous testing will result in the appearance on earth of 44,000 people with hereditary defects, and 29,000 cases of leukosis.

2. New Tolerance Levels Recommended for Radioactive Plutonium, Ruthenium, Iodine, Phosphorus, Sodium, and Tritium

"Bases for Limiting Tolerance Levels for Internal Radiation," by R. S. Tompson, Kh. M. Parker, and Kh. A. Kornberg; Moscow, Dozimetriya Ioniziruyushchikh Izlucheniy, (Dosimetry of Ionizing Radiation), Moscow, Gostekhteoretizdat, 1956, pp 69-77 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 57, Abstract No 62717, p 398)

The limit for permissible concentration, or tolerance level, for plutonium (Pu^{239}) in water has been established at 1.5×10^{-6} microcuries per ml, and the absorption of Pu^{239} has been set at 0.1% of the ingested amount. However, in experiments on rats it was established that only 0.0028% of the ingested amount was absorbed by the gastrointestinal tract. Therefore, in view of the low absorption, it is recommended that a new tolerance level be established at 1.5×10^{-5} microcuries per milliliter.

The limit for permissible concentration of ruthenium-106 in water has been established at 0.1 microcuries per milliliter, on the basis that the biological half elimination period was 20 days. However, it has been determined that the biological half-elimination period for ruthenium through

the kidneys is not 20 days but 40. Therefore, the tolerance level must be decreased by 25 times to equal 4 X 10^{-3} microcuries per milliliter. In addition, the biological half-elimination period for ruthenium-106 from bones is 100-150 days, and it is considered that the period for half-elimination of ruthenium-106 is critical to bone tissues, therefore it is recommended to further decrease the tolerance level for ruthenium-106 to equal 1.0 X 10^{-3}.

Experiments designed to study the toxicity of iodine (I^{131}) over a 5-year period and 600 tests on sheep indicate that the accepted present level of 3 X 10^{-9} microcuries per cubic meter of air should be decreased by a factor of 10^{-4} to equal 3 X 10^{-13} microcuries per cubic meter.

The limit for permissible concentration of radioactive phosphorus (P^{32}) in water also has been recommended to be decreased from the present level of 2 X 10^{-4} microcuries per milliliter to 3 X 10^{-6} because of the great absorption of radioactivity by plant and animal life in reservoirs upon which fish feed, and the fact that fish are part of man's food.

The limit of permissible concentration of radioactive sodium (Na^{24}) has been established at the present time at 8 X 10^{-3} microcuries per milliliter, but the authors recommend that this level not exceed 2 X 10^{-6} microcuries per milliliter.

Finally, since it is established that tritium water (H^3_2O) from the atmosphere enters the body through the skin at about the same rate as through the lungs, the authors recommend that the limit for permissible concentration of H^3 be established at 3 X 10^{-6} microcuries per cubic meter in air and at 5 X 10^{-2} in water if one is to allow the H^3 tolerance level in an organism to equal 1.5 X 10^{-3} microcuries per milliliter.

3. The Uptake and Effect of Fission Products on Plant Life

"The Uptake of Fission Products by Plants and Their Effect on the Plant Organism," by I. V. Gulyakin and E. V. Yudintseva; Izv. Timiryazevsk. s.-kh. akad. (Herald of the Timiryazev Agricultural Academy), 1956, No 3, pp 121-142 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 19, 10 Oct 57, Abstract No 21409, by B. Pleshkov)

"In studying the absorption of Sr^{90}, Zr^{95}, Ru^{106} and Cs^{137} by wheat, it was discovered that Sr^{90} and Cs^{137} were taken up more intensively and accumulated in the portion of the plant above the ground while Ru^{106} and Zr^{95} were taken up less intensively and were accumulated mainly in the roots. The radioisotopes taken up by the portion of the plant above the ground were deposited mainly in the vegetative organs; the grain contained 4.8-5.9% Cs, 1.0-1.8% Sr, and 0.1-0.2% Ru and 0.4-0.5% Zr of the

total element found in the plant. It was discovered, after growing wheat on soil impregnated with radioisotopes, that Sr^{90} was taken up by the portion of the plant above the ground more intensively than Cs^{137}, Zr^{95} and Ru^{106}. With application to the leaves, a large portion of the Cs^{137} applied was transferred to other organs as well as the leaves while Sr^{90}, Ce^{144} and Ru^{106} were transferred throughout the plant less intensively. In addition to their effect on the crop yield, it was discovered that the radioisotopes of Sr, Ce, and Cs display a distinct action on the content of N, P, K, starches and sugars in the plant."

Miscellaneous

4. Yugoslav Forestry Expert Celebrates 50 Years of Work

"Flowers on the Academician's Balcony", by Nasko Frndic; Zagreb, Borba, 16 Mar 58, p 6

Aleksandar Ugrenovic, now 75 years old, is celebrating 50 years of work as a forestry expert. He was born in Petrinja and completed the Forestry Academy (Sumarska akademija) in Zagreb where he received the degree of Doctor of Natural Sciences (doktor prirodnih nauka). He was a candidate for professor at the university but did not obtain this position under the Austro-Hungarian regime. In 1921, he was elected professor at the Forestry Faculty (Sumarski fakultet) in Zagreb where he has remained for 35 years.

Ugrenovic is also editor of the forestry encyclopedia which is in preparation. A team of 120 scholars has been at work on the encyclopedia for the past 4 or 5 years. The encyclopedia is to contain not only a discussion on the forest wealth and the scientific accomplishments in forestry in Yugoslavia but also on various branches of forestry throughout the world.

Ugrenovic participated in the formation of the forestry organization "Silva Mediterranea" in 1922 in Marseilles. The task of this organization was to study the problem of reforestation of barren lands around the Mediterranean Sea, which has now been assumed by the UN. Prof. Ugrenovic was awarded honorary membership 2 years ago as a representative of Yugoslav forestry science.

Ugrenovic has devoted himself to the study of wood technology and to the investigation of the characteristics of individual types of wood. He was especially interested in studying the scientific method of obtaining resin from live tree trunks and for this purpose went to Bordeaux about 1928. Whereas resin was previously imported, production of resin in the forests of Bosnia-Hercegovina, Serbia, and Lika is now at a satisfactory level.

In 1912, Ugrenovic realized that without a knowledge of foreign terminology it would be impossible to keep pace with the world's scientific development. He began work on the elaboration of uniform Serbo-Croatian forestry terminology and on a dictionary. He now has a collection of 9,000 terms translated into French, English, German, Italian, Russian, and Serbo-Croatian.

II. CHEMISTRY

Chemistry and Technology of Fuels and Propellants

5. USSR Work on the Use of Superfine Metal Powders as Fuels, Combustion Catalysts, and a New Material Available for Technological Applications in General

Sverkhtonkiye Poroshki Metallov i Ikh Primeneniye (Superfine Metal Powders and Their Applications, by E. M. Natanson, Doctor of Chemical Sciences, Publishing House of the Academy of Sciences Ukrainian SSR, Kiev, 1957, 64 pp

This book discusses fundamental concepts which have a bearing on the structure, properties, and present-day methods for the production of superfine metal powders and metal sols. Practical applications of metal powders are stressed and progress made in the development of methods for their production is reviewed. According to the notice on the reverse side of the title page, the book will serve the needs of engineers and technicians as well as of operators occupied in the powder metallurgy, chemical, electrotechnical, radio engineering, machine building, and other industries. Furthermore, according to this notice, some sections of the book contain information that will be of interest to persons who study problems pertaining to lubrication and to the improvement of the wearing strength of machines.

After outlining general concepts involved in the study of superfine powders and metal sols, the book discusses the catalytic properties of superfine metal powders (pp 19-26), the pyrophoric characteristics of superfine metal powders (pp 27-28), the antiknock properties of superfine metal powders (pp 28-31), the lubricating properties of such powders (pp 31-37), the magnetic properties of superfine powders of metals and metal alloys (pp 37-44), applications of superfine metal powders in the machine building industry (pp 44-50), corrosion-resistant superfine metal powders (pp 50-51), the formation of structures by superfine metal powders upon contact with rubber adhesives (pp 51-53), and the therapeutic properties of superfine metal powders (pp 55-61). In the general introductory part (pp 3-18), methods for the production of superfine metal powders and metal sols are discussed.

The following methods are outlined on the basis of USSR work: electrical methods, thermal methods, methods based on the decomposition of metal carbonyls, and mechanical methods. It is stated that in recent years in work done at the Laboratory of Colloid Chemistry, Institute of

General and Inorganic Chemistry of the Academy of Sciences Ukrainian SSR, the author and his associates developed new procedures for the preparation of superfine powders and metal sols. Among these procedures the most important is based on an electrolytic method for the deposition of metals in a finely divided state from solutions. The electrolytic procedure which has been developed was tested on a pilot plant and production plant scale. It is described in some detail in the book.

In the section on the catalytic properties of superfine metal powders, work is described that has been done by the author and A. V. Bernshteyn with the purpose of investigating the application of sols of molybdenum in benzene in the desulfurization of liquid motor fuels. It is stated that the use of this sol as a catalyst makes possible very effective desulfurization of technical benzene and automobile gasoline by hydrogenation at room temperature. Experimental work on the desulfurization of liquid fuels with iron sols is also described. The author goes on to discuss the catalytic effect of superfine metal powders on oxidation processes, specifically from the standpoint of their application as catalysts of the combustion of fuels in rocket engines. The following discussion of this subject is contained in the section mentioned above:

"At present, superfine metal powders (iron powders and those of other metals) are being used to an increasing extent as catalysts of diverse oxidation processes, particularly as catalysts of the combustion of fuels in rocket engines.

"In the majority of the known types of rocket engines, liquid bicomponent propellants are used, namely alcohol, kerosene, or gasoline ["gazolin"] which are oxidized by liquid oxygen, hydrogen peroxide, or nitric acid.

"Because the most rapid combustion of the fuel in the least possible volume is very essential for the operation of rocket engines, the selection of the right type of combustion catalysts for the fuels used is one of the most important problems of rocket technology.

"According to data available in the literature, iron is a rather effective catalyst which accelerates oxidation to a considerable extent when it is present in a highly dispersed state in the liquid phase.

"Particularly important is the problem in regard to the selection of catalysts which accelerate combustion in aviation gas turbines. The process of combustion in gas turbines must proceed with the maximum evolution of heat at minimum dimensions and a minimum weight of the engine. Under the circumstances, the specific weight of the fuel used in gas turbines is regarded as one of the most essential factors.

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"There is a tendency at present to increase the specific weight of the fuel by the addition of aromatic hydrocarbons or by the use of petroleum fractions with a higher boiling point. However, this change in the composition of the fuel results in an increased formation of carbon. The amount of carbon increases when the ratio of carbon to hydrogen becomes greater in the liquid fuel and the end boiling point of the fuel increases. For this reason the formation of carbon during the combustion of fuel with a high specific weight is one of the most important problems that have to be solved in connection with the introduction of aviation gas turbines.

"It is obvious that the presence in the liquid fuel with an increased specific weight of dispersed sols of a number of metals (iron, manganese, tungsten, etc.) which function as effective catalysts of combustion must considerably reduce the formation of carbon. From this standpoint, particular attention should be paid to metal organosols the dispersed phase of which is a catalyst of the combustion process and which at the same time forms volatile metal oxides. An example is rhenium, which forms volatile oxides ($Re_2 O_7$) that distill at temperatures below 200°. Even in small concentrations, rhenium is an active catalyst of the oxidation of hydrocarbons.

"The presence in liquid fuel (kerosene or gasoline) of highly dispersed metals is also very advantageous from the standpoint of the catalytic effect exerted by these metals on the decomposition of hydrogen peroxide in cases when this substance is used as an oxidizer.

"For instance, the principle of the decomposition of hydrogen peroxide in the presence of a metal catalyst is used in the well-known British De Haviland Super-Sprite rocket engine, which employs kerosene or gasoline as fuel. Although there are many references in the literature to the application of metals as catalysts of the combustion of liquid fuel in rockets, we have not found [in the literature] any extensive and many-sided investigations on this problem.

"One must also consider that the presence of superfine metal powder in the liquid fuel increases its heating capacity in addition to accelerating combustion. From this viewpoint, the introduction into the fuel of superfine metals in maximum concentrations is of definite interest and should be investigated from the experimental standpoint.

"A number of detailed investigations on this problem has been done. For instance, A. Leonard, starting from theoretical considerations and experimental data that were available, demonstrated that the most important characteristics which an efficient liquid rocket fuel must exhibit are a maximum rate of gas outflow and a maximum total density of the fuel.

"After considering from this standpoint the physical and chemical characteristics of a great number of compounds and elements that can be used as oxidants and fuels in rocket engines operating on liquid fuel, Leonard arrived at the conclusion that the best elements in this respect are hydrogen, lithium, berillium, and boron. These are followed closely by magnesium, calcium, aluminum, and silicon. In Leonard's opinion, the metals mentioned above must be dispersed so that they form fine suspensions in hydrazine or hydrocarbons. If such suspensions prove stable, they can be used successfully as fuel in rocket engines.

"It is obvious that among the metals mentioned, only magnesium, calcium, aluminum, and silicon are of interest from the standpoint of their application as superfine powders dispersed in fuel.

"Other investigators besides Leonard also mentioned the possibility of using organosols of aluminum and magnesium in hydrocarbons as rocket fuels.

"In connection with this, it is of definite interest to investigate the possibility of the application of concentrated organosols of iron in different hydrocarbon media as fuel for rocket engines. Systems of this type may prove to be very suitable and of advantage as far as cost is concerned.

"In investigating this question, one must consider the important role which stabilizing substances play in these systems. As a result of many observations carried out on the combustion of metal organosols in hydrocarbon media, we established that many stabilizing substances [protective colloids] interfere to a considerable extent with the combustion of the dispersed phase of the metal organosols. Usually only the continuous phase oxidizes, while the dispersed metal phase does not participate in the process of combustion and remains in the form of ash.

"One must therefore bear in mind that the selection of suitable stabilizers is of decisive importance from the standpoint of the application of metal organosols as fuels."

In the section on the pyrophoric properties of superfine metal powders, it is pointed out that adequate information on correlations between pyrophoric and catalytic properties of highly dispersed metals is not available in the literature. The author suggests that research be done on the subject and advances the opinion that because of their high reactivity superfine pyrophoric metals can be used as starting materials in the synthesis of organometallic compounds.

In the section on antiknock properties of superfine metal powders, the effect of metals on the decomposition of peroxides is stressed. The effect of organometallic compounds such as those of lead, which have an

antiknock effect, is ascribed to the formation of minute particles of elemental metal. Experimental data which indicate that the metal rather than the organometallic compound exerts the antiknock activity induced an investigation of the antiknock characteristics of a number of metals. Thus, investigation of the antiknock properties of thallium indicated that it is more effective than lead. In the experiments described thallium vapor was introduced into the combustion chamber through a special valve. The effect of the vapors of other metals has been also investigated, in this manner, according to the text of the book. According to the author, the use of organosols of copper, cobalt, chromium, mercury, silver, and iron as antiknock agents has been proposed. Furthermore, the use of aluminum, tin, magnesium, and antimony organosols as combustion inhibitors has been suggested. In work done on the subject, it was established that freshly prepared organosols of iron, lead, and nickel are as effective in suppressing knocking as tetraethyl lead, iron pentacarbonyl, or nickel tetracarbonyl.

In describing his own work on the subject, the author says:

> "Together with M. S. Glushchenko, A. V. Bernshteyn, and M. A. Rokhlenko, we investigated the antiknock properties of a number of metal organosols. These organosols were prepared by the electrolytic method and other methods. In preliminary tests on stationary engines we found that the intensity of knocking during the operation of the engine is considerably reduced when metal organosols have been added to the fuel. This reduction of the intensity of knocking was rather considerable when organosols of iron were used. Quantitative investigations of the antiknock effect produced by organosols or iron, manganese, lead, beryllium, and cadmium were conducted on Waukesha engines. It was established that iron organosols have a considerable effect on the octane number of automobile gasoline, raising this number by 4-5 units. Tetraethyl lead under analagous conditions increased the octane number of the same gasoline by only 9 units. Organosols of lead, cadmium, manganese, and beryllium proved less effective."

The author concludes his discussion of the antiknock characteristics of colloidal metals by stating that metals, if used in this manner, will form deposits in the combustion chamber, so that their actual application as antiknock agents will depend on the development of methods for the removal or prevention of these deposits.

In the section on the lubricating properties of superfine metal powders, experimental work done at Kiev on the application of colloidal metals in lubricating oils and the effects produced by these metals is described. Considerable attention was paid in the work in question to the lubrication of movable electric contacts. Electrolytic equipment for the production of sols of metals in lubricating oil is described in detail.

In the section on the magnetic properties of superfine metal powders the use of such powders for the manufacture of electromagnet cores consisting of metal and a dielectric is described. The use of metal powders for the production of permanent magnets is also discussed. It is pointed out that the attempts by a number of investigators to increase the coercive force of magnets made of superfine iron powder were unsuccessful, because the iron powders used were prepared by the thermal method and the iron particles were therefore of a spherical shape: it would be advisable to investigate the possibility of using the disperse phase of iron organosols prepared by the electrolytic method, because then the colloidal iron consists of particles which have a pronounced microdendritic structure.

In the remaining part of the section on magnetic properties of metal powders, the use of such powders in magnetic defectoscopy is discussed.

The section on the application of superfine metal powders in the machine building industry describes USSR methods for the production of metal-ceramic alloys used as electric contacts and materials for cutting tools. The production of electric contacts is emphasized and the production of cutting alloys discussed rather briefly. It is stated that the principle types of cermets used as cutting alloys are WC-Co, WC-TiC-Co, and WC-TiC-TaC (Nb C)- Co. The properties and applications of WC-Co cermets in the production of machine parts and instrument parts are also discussed briefly. The section on application of metal powders in the machine-building industry is concluded with a discussion of brake materials. It is stated that the high degree of dispersion of the metals in the type of metal powder discussed in the book improves the mechanical properties of the machine parts made of this metal and confers on them a superior heat resistance.

In the section on corrosion-resistant superfine metal powders, procedures developed by P. A. Rebinder and V. I. Likhtman for coating metal powders with oleic acid are described. The advantages from the standpoint of protection against corrosion of the electrolytic method for the production of organosols of metals developed by the author of the book and his associates are also brought out. In view of the fact that the electrolysis is conducted in the presence of an organic solvent the particles of metal powder are coated with this solvent (e.g., lubricating oil) at the moment of formation at the cathode. Thus, the particles are protected from corrosion.

According to the author, another advantage of the method is that a higher degree of dispersion becomes possible because of the continuous removal of centers of crystallization from the discharge sphere due to

the fact that a rotating cathode is used. The degree of dispersion is increased still further by reason of the polarization of the cathode as a result of the adsorption of water-insoluble surface-active compounds of it. (The degree of dispersion is controlled by regulating the rate of revolution of the rotating cathode.)

In the concluding section of the book, the author points out that superfine metal powders and metal sols have not been applied extensively hitherto because suitable methods for their production were not available. At present, because simple methods for the manufacture of such powders and sols on a plant scale have been developed, it is advisable to conduct extensive investigations aimed at the widest possible application of dispersed metals in various fields of industry and national economy.

A bibliography consisting of 19 USSR references and 2 US references follows the text of the book.

6. Use of a Mass Spectrometer for the Control of the Separation Efficiency of Chromathermographic Devices

"Use of a Mass Spectrometer for the Determination of the Separation Efficiency of Chromathermographic Units," by N. M. Turkel'taub and L. Yu. Abramovich, All-Union Scientific Research Institute of Petroleum Geology and Prospecting; Moscow, Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 43-47

It was established that an MS-2 mass spectrometer can be used successfully for the periodic control of the completeness of separation of complex mixtures by the chromathermographic method as well as for the selection of optimum conditions for the operation of chromathermographic units.

The mass-spectrometric analysis of fractions obtained by the separation of gaseous mixtures on chromathermographic units has shown that normal saturated and unsaturated hydrocarbons can be completely separated on a No 4 chromathermograph. With a No 5 chromathermograph nitrous oxide can be separated from hydrocarbons in addition to the separation of the compounds mentioned above. On a universal chromathermographic unit the separation of butane isomers is possible as well.

Chemistry and Technology of Nuclear Fuels and Reactor Materials

7a. A Polarographic Method for the Determination of Uranium in the Presence of Vanadium and Iron

"Polarographic Determination of Uranium in the Presence of Vanadium and Iron," by Yu. V. Morachevskiy and A. A. Sakharov, Leningrad State University imeni A. A. Zhdanov; (Moscow, Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 83-87

A method has been developed for the polarographic determination of 0.1-1 mg of uranium in the presence of vanadium and iron by measuring the limiting current of hexavalent uranium at a constant concentration of V^{IV} (0.01 mols per liter). When the concentration of V is held constant, this element does not interfere with the determination of uranium. It was established that in sulfuric acid solutions the U^{III}/U^{IV} anodo-cathodic wave is suitable for the polarographic determination of uranium independently at the ratio of the concentration of tetravalent uranium to that of trivalent uranium. A method has been worked out for the polarographic determination of uranium in solutions in the presence of vanadium and iron after preliminary electrolysis of the solution with a mercury cathode. This method is applicable at an absolute content of uranium which does not exceed 0.4 mg. Preliminary experiments have shown that the presence of Mg, Al, Cu, Ti, and Mn does not interfere with the polarographic determination of uranium when this method is used.

7b. A Gravimetric Method for the Determination of Uranium

"Gravimetric Determination of Uranium With the Use of Cupferron for Its Separation," by S. V. Yelinson and V. A. Oleznyuk, Moscow, Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 95-99

A gravimetric method has been developed for determining uranium in ores and concentrates containing more than 5% of U. The method is based on the separation of impurities with cupferron and precipitation of tetravalent uranium with the same reagent after reduction with sodium hyposulfite.

7c. A Radiometric Method for the Determination of U, Th, Ra, and K in Igneous Rocks

"Use of Radiometric Methods for the Simultaneous Separate Determination of Uranium, Thorium, Radium, and Potassium in Acidic Igneous Rocks," by A. S. Serdyukova and Yu. T. Kapitanov, Institute of Geochemistry and Analytical Chemistry, Academy of Sciences USSR; Moscow Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 88-94

A method has been developed for the simultaneous separate determination of U, Th, Ra, and K in acidic igneous rocks. Samples of El'dzhurta granites from the Tyrny-Auz region were investigated, and, to determine the sensitivity of the method, also artificial mixtures with a content of radioactive elements lower than that of the El'dzhurta granites.

7d. A Method for the Determination of Platinum and Palladium in Uranium

"Spectrochemical Determination of Platinum and Palladium in Uranium," by O. I. Bufatin, A. N. Zaydel', and N. I. Kaliteyevskiy, Leningrad State University imeni A. A. Zhdanov; Moscow Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 116-118

A method is proposed for the determination of small amounts of platinum and palladium in uranium. Spectrochemical determinations follow the separation of the elements to be determined by coprecipitation of platinum and palladium sulfides with copper sulfide. By using this method a quantitative determination of 10^{-4}% of Pt and 3×10^{-5} of Pd in U can be made. The method can be used for the determination of Pt and Pd in other mixtures, provided that the principal component of the mixture is not precipitated with hydrogen sulfide. The suitability of the method for the determination of platinum present in a mixture of rare-earth elements has been checked.

7e. Reduction of Neptunium With Rongalite

"Reduction of Neptunium To the Trivalent State By a Chemical Method," by A. D. Gel'man and M. P. Mefod'yeva; Moscow, Atomnaya Energiya, Vol 4, No 3, Mar 58, pp 271-274

It was established spectrophotometrically that sodium formaldehydesulfoxylate (rongalite) reduces Np (IV) to Np (III) in nitric acid and hydrochloric acid solutions. Although the reduction takes place both in a nitrogen atmosphere and in air, the degree of reduction and the stability of Np (III) are greater in a nitrogen atmosphere. It was found that increasing the total content of reducing agents (hydrazine + rongalite) in the solution has a favorable effect on the reduction of neptunium to the trivalent state; reduction of neptunium in nitric acid solutions proceeds on the average to the extent of 70% and in hydrochloric acid solutions to the extent of 95%.

It was established that on reduction of Np (V) with rongalite a mixture of Np (III) and Np (IV) is formed. When Np (IV) is present, Np (III) exhibits a pronounced stability to oxidation with oxygen of the air.

8. New Protection Against Neutron Radiation

Budapest, Technika, No 4, Apr 58, p 7

According to source, chemists have discovered in the boron isotope B-10, a new substance which gives considerable protection from neutron radiation. The new substance, the name and composition of which have not yet been made public, is nonradioactive, and is 5 times as effective as natural boron. Its shielding properties are 20 times as great as those of lead and 500 times as great as those of concrete.

9. Hungarian Discusses Lubricants for Atomic Reactors

"Lubricants for Atomic Reactors," by Gabor Foldiak, graduate engineer, Budapest, Technika, No 4, Apr 58, p 4

Author discusses the requirements for lubricating oils and greases used in atomic power plants, and the deterioration caused in said lubricants by radiation. He includes a table listing radiation effects of a 12.5 MW atomic reactor on lubricants according to place lubricated and intensity of radiation in roengten hours.

Radiation Chemistry

10a. Action of Gamma Radiation on Silicone Rubber

"Effects of Irradiation on the Properties of Silicone Rubbers," by Yu. S. Lazurkin and G. P. Ushakov; Moscow, Atomnaya Energiya, Vol 4, No 3, Mar 58, pp 275-280

As a result of gamma irradiation, silicone rubber undergoes a number of changes caused by cross-linking. The modulus of elasticity increases linearly with the dose of radiation up to a dose of 150-200 megarads. The temperature of vitrification (minus 120° to minus 125°) remains practically unchanged up to 100 megarads and comprises minus 110° to minus 115° at 270 megarads. The rate of crystallization and the degree of crystallinity are lowered by the formation of cross-links. The melting point drops from minus 35° in the case of the initial product to minus 55° for rubber that has been irradiated with a dose of 40 megarads. A dose of 100 megarads suppresses crystallization almost completely. After exposure to this quantity of radiation, hard rubbers are formed which have a modulus of elasticity amounting to 200-250 kilograms per square centimeter, a high stability at low temperatures (a temperature of vitrification T_g equal to approximately minus 125°), but a very low elongation (15-20%) at a tensile strength of 30-40 kilograms per square centimeter.

The work described was undertaken with the purpose of investigating the radiation stability of silicone rubbers and of establishing whether their crystallization can be impeded by cross-linking. Although silicone rubbers have potentially a very high stability at low temperatures (their vitrification point is very low), they are not used at these temperatures because of rapid hardening at minus 40° to minus 45° due to crystallization.

10b. Effect of Alpha Irradiation on Corrosion of Pt and Zr in Hydrobromic Acid

"The Effect of Alpha Activity on the Rate of Corrosion of Platinum and Zirconium in Hydrobromic Acid," by D. M. Ziv and I. A. Efros; Moscow. Atomnaya Energiya, Vol 4, No 3, Mar 58, pp 293-294

It was established that introduction into a hydrobromic acid solution of a significant amount of alpha activity (in the form of Po^{210}) does not result in an appreciable increase in the rate of corrosion of platinum. At 80° the presence in the solution of alpha activity in the amount of 0.3 curies per milliliter results only in an insignificant increase in the rate of the corrosion of this metal. It was established that samples of platinum which are fully immersed in the liquid corrode more rapidly than samples partly immersed into the liquid and that the latter corrode more rapidly than samples suspended in the vapors above the solution.

In the testing of samples of zirconium it was found that presence in the solution of polonium in a quantity corresponding to 0.25-0.3 curies per milliliter increases the rate of corrosion by a factor of approximately 100. A sample of technical ziconium in the form of a cube, which under ordinary conditions practically does not corrode at all, was found to corrode as rapidly as zirconium foil when alpha activity is present.

The increase in the rate of corrosion of platinum and particularly of zirconium under the effect of alpha irradiation is explained by the action of atomic bromine, hydrogen peroxide, and other products of radiolysis.

11a. Investigation of the Oxidation of Ni-Cr-Al Alloys With the Aid of Fe^{59} and Cr^{51}

"Investigation of Iron and Chromium Diffusion of the Spinels $NiCr_2O_4$ and $NiAl_2O_4$ Using Fe^{59} and Cr^{51}" by I. N. Belokurova and D. V. Ignatov, Moscow Atomnaya Energiya, Vol 4, No 3, Mar 58, pp 301-302.

In view of the fact that Ni-Cr-Al alloys containing small quantities of other elements are used extensively at present, the Institute of Metallurgy imeni Baykov, Academy of Sciences USSR, investigated the oxidation of such alloys. It was established that the spinels $NiCr_2O_4$ and $NiAl_2O_4$ are the principal products of the oxidation at 800-1000° of alloys consisting of 80% of nickel and 20% of chromium and of 73% of nickel, 20% of chromium, and 7% of aluminum. Under the circumstances, the parameters of diffusion of Cr and Fe through $NiCr_2O_4$ and $NiAl_2O_4$ were investigated with the aid of the radioactive isotopes Fe^{59} and Cr^{51}. An attempt was made to correlate the values obtained with the rate of oxidation of the alloys. This proved rather difficult because of the complexity of the processes involved. However, the strength of the bonds in the spinel lattices was estimated on the basis of the energies of activation of the diffusion of Cr and Fe and some conclusions were made in regard to the kinetics of the oxidation of the two alloys mentioned on the basis of the difference in the energies of activation of the diffusion of chromium in the spinels $NiCr_2O_4$, and $NiAl_2O_4$, respectively.

11b. Use of Tritium As a Tracer for Petroleum Well Waters

"Experience in the Use of Tritium As a Tracer For Strata Waters" by F. A. Alekseyev, V. N. Soyfer, V. A. Filonov, and Ya. B. Finkel'shteyn; Moscow, Atomnaya Energiya, Vol 4, No 3, Mar 58, pp 291-301

Techniques used in experimental work on the determination of the flow of strata waters with the use of tritium as a tracer are described. The work in question was done at one of the Groznyy petroleum fields. The results obtained are regarded as indicating that tritium is a reliable tracer for this purpose.

Analytical Chemistry

12. Determination of Tantalum in Titanium Alloys With the Aid of the "Arsenazo" Reagent

"Photometric Determination of Tantalum in Titanium and Its Alloys by Means of the Arsenazo Reagent," by Ye. I. Nikitina, Moscow Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 72-78

A photocolorimetric method has been developed for determining tantalum in titanium and its alloys by means of the arsenazo reagent in tartrate solutions. This reagent forms a soluble, violet colored compound with titanium in strongly acidic solutions, particularly hydrochloric acid solutions. It was established that a tantalum-arsenazo complex is formed in

tartrate and citrate solutions; it is stable on heating up to 100°. It was furthermore established that the titanium-arsenazo complex is completely destroyed in strong hydrochloric acid solutions, so that it does not interfere with the photocolorimetric determination of tantalum with the arsenazo reagent when tantalum is present in the form of its tartrate complex. A simple and fast photocolorimetric method has been worked out for determining 1-15% of tantalum in titanium-alloys by means of the arsenazo reagent without preliminary separation of the titanium.

The arsenazo reagent is benzene-2-arsonic acid (1-azo-7)1,8-dihydroxynaphthalene-3,6-disulphonic acid, which was synthesized by V. I. Kuznetsov (Zhurnal Analiticheskoy Khimii, Vol 7, pp 226, 1952) and has been recommended as a reagent for the photometric determination of the rare-earth elements, tetravalent vanadium, zirconium, aluminum, and niobium. It was found that the niobium tartrate complex also forms a violet compound with the arsenazo reagent and that the properties of this compound are quite similar to those of the analogous tantalum compound. Under the circumstances niobium, if present in the titanium alloy, is also determined together with the tantalum by the method described. The sensitivity of the test for niobium is the same as that for tantalum.

Industrial Chemistry

13. Development of the USSR Plastics Industry

"Modern Chemistry" (unsigned article); Moscow, Nauka i Zhizn', Vol 25, No 1, Jan 58, pp 4-5

In an interview conducted at the editorial office of Nauka i Zhizn' several scientists replied to questions and made statements on current and future progress in different fields of technology in the USSR. M. I. Garbar, Chief of the Technical Administration, Ministry of the Chemical Industry USSR, outlined as follows current progress in the USSR chemical industry:

"As far as the rate of expansion is concerned, the chemical industry is ahead of all other branches of industry both in the USSR and abroad. It develops at a faster rate than the power industry. This, in itself, indicates the importance of chemistry at present. If we compare different fields of chemical production, we find that the synthesis of high molecular materials develops most rapidly, primarily as far as the production of plastics, synthetic fibers, elastomers, and other polymers is concerned.

"Within the next few years the production of various plastics in the USSR will increase sharply. This applies particularly to polyethylene and polypropylene, which have a high mechanical strength and exhibit superior characteristics as insulators and chemically resistant materials. Hitherto polyethylene was produced at a very high pressure (up to 1,500 atmospheres). New organometallic catalysts have been developed which make it possible to obtain a polymer of superior quality under conditions that do not involve the application of high pressures. Under the circumstances the necessity of using complex, large sized, and expensive equipment is eliminated. Work is also conducted on the production of polyethylene by radiation-chemical methods.

"Polyvinyl chloride is an excellent substitute for lead in the production of electric cables. One ton of this type of plastic makes it possible to save 3-5 tons of metal. Polyurethane resins are extraordinarily light in weight. Their specific weight is one hundreth of that of water. Ftoroplast-4 (teflon) is superior to most other plastics as far as chemical stability is concerned. This plastic is not affected even by a boiling mixture of nitric and hydrochloric acids, which dissolves gold and platinum. All these and many other no less valuable materials will be applied extensively in the USSR technology.

"It is difficult to overestimate the importance of synthetic elastomers for the national economy. Recently, Soviet scientists have developed several new types of elastomers which ought to prove very valuable from the standpoint of their industrial application. Among these elastomers are isoprene rubber, which is very similar to natural rubber as far as its characteristics are concerned; chloroprene rubber, which is resistant to nitrogen; organosilicon elastomers, which are heat resistant; elastomers that contain fluorine and resemble teflon as far as their chemical characteristics are concerned; etc.

"The expansion of the production of diverse synthetic fibers will be of advantage not only to different branches of the industry, but also from the standpoint of applications in the form of consumers goods. This refers not only to capron and nylon but also to lavsan [dacron], anid [a fiber of the nylon type], khlorin [perehlorovinyl], enant [a polyamide fiber derived from aminoenanthic acid], and other fibers developed by USSR scientists."

Inorganic Chemistry

14. Methods for the Control of the Purity of Rhenium in Production

"A Spectral Method for the Determination of Small Quantities of Lead, Tin, Cadmium, Antimony, and Bismuth in Metallic Rhenium," by Yu. I. Kutsenko, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR, Moscow, Zhurnal Analiticheskoy Khimii, Vol 13, No 1, Jan/Feb 58, pp 107-111

The production of metallic rhenium of high purity requires the development of methods for the determination in it of a number of impurities the presence of which has a noticeable effect on the physicochemical characteristics of the metal. The principal impurities of this type are bismuth, lead, tin, antimony, and cadmium: the content of either of these metals must not exceed 1×10^{-4}%. In view of the fact that methods sensitive enough for the determination of the impurities in question present in these quantities could not be found in the available literature, suitable methods for this purpose were developed.

A spectrochemical method for the determination of Cd, Bi, and Sb in metallic rhenium was devised. This method involves separation of the impurities from rhenium by precipitating the rhenium with thallium acetate in an acetic acid solution and adsorption of the impurities on freshly precipitated beryllium hydroxide. The sensitivity of this method is 1×10^{-4}% and its precision 15-20%. A spectroanalytical method for the determination of Pb, Sn, Cd, Bi, and Sb after sublimation of the rhenium was also developed. The sensitivity of this method is 2×10^{-4} for antimony and 1×10^{-4}% for lead, tin, cadmium, and bismuth; its precision is 15-20%. The results obtained in the analysis of rhenium for Sb, Bi, and Cd by both methods were found to be in fairly good agreement.

Isotope Chemistry

15. Separation of Isotopes by Distillation

"Enrichment Factors for Chlorine and Sulfur Isotopes at Liquid Vapor Equilibria for Cl_2, HCl, CH_3Cl, H_2S, and So_2," by I. G. Gverdtsiteli, T. A. Gagua, and Yu. V. Nikolayev; Moscow, Atomnaya Energiya, Vol 4, No 3, Mar 57, pp 294-296

Procedures that were applied for the determination of the enrichment factor of Cl^{37} and S^{34} in the compounds indicated in the title, and the rectification column used for enriching these isotopes by the distillation of the compounds in question are described. The rectification column was calibrated in regard to the number of theoretical plates by separating with its aid the boron isotopes of the compound BF_3. This compound was chosen because its coefficient of isotope separation is known. Differences in the vapor pressures of isotopes for the compounds investigated were calculated on the assumption that the number of theoretical plates is the same as in the case of BF_3.

Organic Chemistry

16. Research on Organophosphorus Compounds

"Thimethoxy- and Triaroxyphosphazosulfonitrophenyls and Diesters of Nitrophenylsulfonamidophosphoric Acids," by A. V. Kirsanov and N. G. Feshchenko, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 28, No 2, Feb 58, pp 339-343

Trimethoxy- and triaroxyphosphazosulfonitrophenyl compounds and the dimethyl and diaryl esters of nitrophenylsulfonamidophosphoric acids were prepared and described. These compounds were prepared for the purpose of studying their insecticidal properties and also as possible starting materials for the preparation of derivatives of N-phosphoric acid sulfonamides.

"Trimethoxy and Triaroxyphosphazosulfonitrophenyls and Diesters of Nitrophenylsulfonamidophosphoric Acids," by A. V. Kirsanov and N. G. Feshchenko, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 28, No 2, Feb 58, pp 339-343

Trimethoxy and triaroxyphosphazosulfonitrophenyls (I) and diesters of nitrophenylsulfonamidophosphoric acids (II) were synthesized for the purpose of investigating their insecticidal properties and also for use as starting materials for the synthesis of derivatives of N-phosphoric acid sulfanylamides. (I) were prepared by the reaction of trichlorophosphazosulfonitrophenyls with sodium methylate or arylate in a benzene solution. (I) cannot be saponified in aqueous alkaline solutions since they are insoluble in water, but in aqueous alcohol solutions of alkali they readily saponify to form (II).

"Substituted Imido and Monoarylsulfamides," by A. V. Kirsanov and Yu. M. Zolotov, Dnepropetrovsk Metallurgical Institute; Moscow, Zhurnal Obshchey Khimii, Vol 28, No 1, Feb 58, pp 343-347

1,5-diphenyl and 1,1,5,5-tetramethylimidosulfamides were prepared. It was shown that an earlier proposed scheme for the formation of imidosulfamides was not correct and a new scheme is proposed in place. A number of monoarylsulfamides were also prepared.

"Trichlorophosphazoaroxydichloracetyls," by A. V. Kirsanov and V. P. Molosnova, Dnepropetrovsk Metallurgical Institute; Moscow, Zhurnal Obshchey Khimii, Vol 28, No 2, Feb 58, pp 347-350

Trichlorophosphazoaroxydichloroacetyls and the acid dichlorides of aroxydichloroacetylamidophosphoric acids were prepared. The reaction took place according to the following equation:

$$ArOCOCONH_2 + 2PCl_5 \rightarrow 2HCl + POCl_3 + ArOCCl_2CON{=}PCl_3$$

"Trichlorophosphazosulfonitroaryls and Their Hydrolysis Products," by A. V. Kirsanov and N. G. Feshchenko, Institute of Organic Chemistry, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Obshchey Khimii, Vol 27, No 10, Oct 57, pp 2817-2820

Trichlorophosphazonitrophenyl compounds and their hydrolysis products were prepared and described. Until now, these compounds were unknown. They were prepared by the action of phosphorus pentachloride on o-, m-, and p-nitrobenzenesulfamides:

$$NO_2C_6H_4SO_2NH_2 + PCl_5 \rightarrow 2HCl + NO_2C_6H_4SO_2N{=}PCl_3$$

17. USSR Patent Description for TEPF Preparation

"Method for Preparing Tetraethylthiopyrophosphate," by A. Ye. Arbuzov, B. A. Arbuzov, P. I. Alimov, and K. V. Nikonorov, Description of Original Process for USSR Certificate of Authorship, submitted 29 December 1949 for No 5042/454555 with the Ministry of Chemical Industry

"Tetraethylthiopyrophosphate is one of a number of organic compounds that possess strong insecticidal properties. It was first prepared in pure form in 1932. Methods for preparing similar preparations in pure form are complex and difficult.

"This invention proposes a method for the preparation of the new insecticide tetraethylthiopyrophosphate. The method is outstanding in simplicity and consists of the action of sodium diethylmonothiophosphate on diethylphosphoric acid chloride. The product has the following chemical structure:

$$(C_2H_5O)_2\overset{\overset{S}{\|}}{P}-O-\overset{\overset{S}{\|}}{P}(OC_2H_5)_2$$

"The product has strong insecticidal properties, capable of complete destruction of ticks at a concentration of 0.0062% of the preparation (0.0031% of the active ingredient).

"Example: Sodium diethylphosphide, prepared from 10 grams of diethylphosphorous acid and 1.7 grams of metallic sodium in benzene solution, has 2.3 grams of sulfur added to it. After completion of the reaction, 12.5 grams of diethylphosphoric acid chloride are added to the above prepared sodium salt of diethylmonophosphoric acid. Next, the solution is separated from the sodium chloride precipitate. The precipitate is then treated with water until the sodium chloride is dissolved and the aqueous solution is then shaken with a small amount of ether. The ether extract is dried over calcium chloride. After the solvent is distilled off, the residue is distilled under vacuum.

"The resulting product boils in the interval 142-143° at a residual pressure of 4 mm of mercury.

Subject of the Invention

"1. Method of preparing tetraethylthiopyrophosphate is distinct in that diethylphosphoric acid chloride acts on the sodium salt of diethylmonothiophosphoric acid.

"2. Use of tetraethylthiopyrophosphate as prepared according to paragraph 1 as an insecticide."

III. EARTH SCIENCES

18. Plenary Session of the Agricultural Meteorological Section of the All-Union Academy of Agricultural Sciences Imeni Lenin

"Plenary Session of the Agricultural Meteorological Section of the All-Union Academy of Agricultural Sciences imeni Lenin", by A. Shul'gin; Moscow, Vestnik Sel'skokhozyaystvennoy Nauki, No 8, Aug 57, pp 154-155

"A Section on Agricultural Meteorology has been established for the development of scientific research on agricultural meteorology and agroclimatology in agricultural, scientific-research, and educational institutions and experimental stations and for the coordination of work conducted in other departments on agrometeorology of the Department of Soil Sciences of the All-Union Academy of Agricultural Sciences imeni Lenin. Twenty persons have been confirmed as members of the bureau of the section. F. F. Davitsaya has been elected chairman of the section and V. N. Stepanov and A. M. Shul'gin deputy chairmen.

"The first plenary session of the section was held on 21-23 May 1957. Agrometeorologists, agroclimatologists, and workers of agricultural vuzes (higher educational institutions), universities, institutes, and administrations of the hydrometeorological-service, the scientific research institutes of the All-Union Academy of Agricultural Sciences imeni Lenin, the Ministry of Agriculture USSR, and institutes of the Academy of Sciences USSR participated in the work of the plenary session.

"The plenary session investigated the status of the work on agroclimatology in the various rayons of the USSR and also the results of research on agroclimatology and water resources in areas of virgin and fallow lands.

"The following reports were given on the problem of agroclimatology: Prof G. T. Selyaninov -- "The Principles of Agroclimatological Subdivision of the Territory of the USSR; Prof S. A. Sapozhnikova -- "Experience in the Agroclimatological Subdivision of the Territory of the USSR;" D. I. Shashko, Doctor of Geographical Sciences -- "Agroclimatological Subdivision of the Territory of the USSR According to Conditions for Ensuring Plants Both Warmth and Moisture;" Prof V. P. Popov -- "Agroclimatological Subdivision of the Territory of the Ukrainian SSR;" N. V. Gumenova -- "On the Status of the Work of Compiling Oblast Agroclimatological Reference Books for Use in Agricultural Production."

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"The plenary session reports indicated positive results of works completed on the agroclimatological subdivision of territories of the USSR and the Ukrainian SSR, as well as attempts to combine the former with fertilization of basic agricultural crops. The speakers also made critical remarks and recommendations for preparing the proposed maps and improving their accuracy.

"During the plenary sessions resolutions were approved concerning the basic principle of agroclimatization in the territorial subdivisions of the USSR; also mentioned was the necessity for future development of work on the agroclimatology of the territorial subdivisions of the USSR, the Union Republics, economic regions, and individual farms and the formation of an all-inclusive map. In addition, the importance in the development of work on agriclimatological territorial subdivision of individual agricultural crops was recognized. Also acknowledged was the necessity of publishing oblast agroclimatological reference books.

"The following additional reports were presented at the plenary sessions: V. A. Uryvayev -- "Agroclimatology and Water Resources of the Regions of Virgin and Fallow Lands; "M. S. Kulik -- "The Status of Water Supply for Vernalized Wheat Under the Basic Cultivation Methods in the Steppe Region of Kazakhstan and Kulunda;" Prof I. A. Gol'dberg -- "The Study of the Microclimate in the Region of Small Dry Hills in Kazakhstan."

"The plenary session approved the contents of the reports and pointed out the major scientific and practical value in the publication of works on agroclimatology and water resources in the regions of virgin and fallow lands.

"The new section established a problem plan for research during the period 1957-1960 which included the following essential research problems: (1) the agroclimatological basis for the efficient distribution and specialization of agricultural production; (2) study of the relationship of various agricultural crops and varieties to climatic conditions during distinct periods of growth, according to the natural zones of the country, for the effective utilization of climatic resources and to combat unfavorable climate and weather; (3) agroclimatic evaluation of the efficacy of agricultural engineering measures and territorial subdivision according to natural zones; (4) development of methods of evaluating the status and prognosis of growth, and the development and possible productivity of agricultural crops in conjunction with climatic and weather conditions; (5) and development of a method of recording climatic conditions applicable to the peculiarities of agriculture and the formation of new, more progressive and simpler meteorological instruments."

IV. ELECTRONICS

Communications

19. Transistorized Horizontal Frequency Master Oscillator

"Master Oscillator," by Ye. F. Tsaplina and T. N. Tayd, Informatsionno-tekhnicheskiy sbornik VNII MRTP, 1957, No 1, pp 11-12 (from Tekhnika Kino i Televideniya, Moscow, No 3, Mar 58, p 83)

"A horizontal-frequency, quartz stabilized master oscillator with buffer-shaper stages using junction transistors is proposed. Schematic diagrams and data are given for the oscillator."

20. VHF Amateur Radio Stations in USSR

"Let's Transform Into Reality the Resolutions of the IV DOSAAF Convention" (unsigned article); Moscow, Radio, No 4, Apr 58, pp 1-2

The article contains the following passage:

"Although there was some improvement in dissemination of radio engineering information, as was mentioned at the convention in the report of P. A. Belov, the Chairman, Central Committee Dosaaf (Volunteer Society for Cooperation With the Army, Air Force, and Navy), the training of radio experts still lags far behind present requirements. Up to now the training of radio engineering personnel, on the whole, is restricted to the society's clubs, and only an insignificant amount of such training is taking place at the primary organizations. At one time the V Plenum of the Central Committee of Dosaaf obligated Dosaaf's committees to open, within the next 2 years, shortwave and ultrashort-wave [VHF] amateur radio stations in every city and large rural district. Two years have already passed, but it is still a long time before this resolution will be fulfilled. For example, the whole Primorskiy [Maritime] Kray has only seven radio stations, and Dagestan has only one. In Pskovskaya and Belgorodskaya oblasts and in one half of Kazakhstan's oblasts there is not a single USW [VHF] radio station."

21. Mirror-Lens Objective for TV Cameras

"Mirror-Lens Objective for Television Cameras," by N. F. Kuzayev, V. Kh. Muradov, and V. A. Fatov, Informatsionno-tekhnicheskiy sbornik VNII MRTP, 1957, No 1, pp 38-39 (from Tekhnika Kino i Televideniya, Moscow, No 3, Mar 58, p 82)

"For the purpose of improving the parameters of television cameras using type LI18 tubes and widening their applicability, it is suggested that mirror-lens objectives with an aspherical disc be used, which would allow a decrease in the amount of illuminance needed on the transmitted objective by approximately ten times in comparison with the illuminance needed for lens objectives."

22. New Transistorized TV Sweep Generators

"Transistorized Horizontal and Vertical Sweep Generators," by G. I. Oliferenko, Informatsionno-tekhnicheskiy sbornik VNII MRTP, 1957, No 1, pp 3-8 (from Tekhnika Kino i Televideniya, Moscow, No 3, Mar 58, p 82)

"A description is given of several original television horizontal and vertical sweep generators for type LI18 camera tubes using transistors.

"Detailed schematics of the generators are given and their principles of operation are explained."

23. A System of Automatic Diaphragm Aperture Regulation in Image Orthicon Cameras

"Automatic Diaphragm Aperture Regulator," by V. P. Abakumov and M. N. Tsaplin, Informatsionno-tekhnicheskiy sbornik VNII MRTP, 1957, No 1, pp 26-27 (from Tekhnika Kino i Televideniya, Moscow, No 3, Mar 58, p 82)

"It is noted that, until the present time, systems of automatic diaphragm aperture regulation have not been used in television cameras using image orthicon tubes. In cameras with other types of tubes, phototubes are used as the pickup for systems of automatic diaphragm aperture regulation. At the same time, construction of the camera is made considerably more complicated and expensive, and its size is increased.

"An arrangement is suggested for automatic diaphragm aperture control which operates from the photocurrent of image orthicon pickup tubes.

"It is shown that the use of such a system permits a significant increase in the reliability of operation and the life of image orthicon type tubes."

24. New Soviet Patents in the Field of Communications

"Authorship Certificates" (unsigned article); Moscow, Electrosvyaz', No 4, Apr 58, p 78

Class $21a^4$, 22_{01}, No 108411. A. Yu. Lev and D. M. Leyb. A Method of Correlating the Distortions of Electric Pulses.

Class $21a^4$, 29_{01}, No 108627. M. K. Belkin. Superregenerative Receiver.

Class $21a^4$, 29_{01}, No 108733. Yu. A. Polyakov. A Method for Expanding the Frequency Range of a Search Receiver.

Class $21a^4$, 35_{14}, No 108629. V. A. Makarov, G. V. Kalashnikov, and S. P. Bykovskiy. Controllable Power Transformer for Voltage Stabilizers.

Class $21a^4$, 42. No 108640. O. G Seliverstrov. Circuit of a Wide-Band FM Detector.

Class $21a^4$, 68. No 108097. A. M. Trakhtman, V. V. Zasetskiy, and P. Ye. Miroshnichenko. Miniature Delay Line.

Class $21a^4$, 71. No 107853. G. N. Paliy. A Device for Measuring the Instantaneous Frequency Values of Electric Oscillations.

Class $21a^4$, 71. No 107961. V. G. Vasil'ev. An Automatic Compensating Device for Measuring and Registering Variable Values of EMF and Current.

Class 21b, 17. No 108324. I. P. Samokhvalov, D. B. Zlotnikova, and A. A. Maklyarskaya. A Method of Increasing the Utilization Factor for Nickel in Nickel Oxide Electrode of an Alkaline Storage Battery.

Class 21b, 25_{03}. No 108327. N. A. Marasanov and B. V. Ershler. A Method of Increasing the Electrochemical Utilization of Nickel in Nickel Oxide Electrode of Alkaline Storage Batteries.

Class 21b, 36_{10}. No 108031. V. M. Semenov and V. B. Sergeyev. A Device for Registering the Level of Facsimile Signal.

Class 21e, 42_{02}. No 108003. P. A. Sul'g. A Device for Uninterrupted Power Supply to Electric Installations.

Class 21e, 12. No 108116. Yu. F. Balalayev. A Device for Measurement of Coercive Force in Steel Parts.

Class 21e, 36. No 107409. L. Sh. Kherets. A Device for Direct Measurement of the AC Form Factor.

Class 21e, 36. No 108050. N. K. Podgur. A Device for Measurement of Small Current and Voltage.

Class 21g, 4_{05}. No 108337. I. A. Rakhlevskiy and L. L. Knots. Electron Time Relay.

Class 21g, 13. No 108428. K. I. Bukharin, M. V. Vink, and G. M. Moskovskaya. Oscillator Tube with Exterior Plate.

Class 21g, 13_{14}. No 108085. A. M. Bonch-Bruyevich, Ye. S. Grishin, and U. B. -S. Soltanov. Electronic-Semiconductor Amplifying Tube.

Class 21a, 46_{04}. No 109205. A. A. Metrikin. Transmitting Antenna Array With Circular Radiation Pattern.

Class $21a^1$, 11_{02}. No 109133. A. I. Kordobovskiy. A Device for Establishing the Proper Phase in Start-Stop Telegraphs.

Class $21a^1$, 11_{02}. No 109203. Yu. I. Savitskiy and A. Ya. Ogoshkin. Transmitter for a Start-Stop Telegraph.

Class $21a^1$, 11_{02}. No 109259. V. N. Kulakov and G. V. Kriger. Electromagnetic Automatic Stop for Start-Stop Telegraphs.

Class $21a^2$, 12_{02}. No 109135. M. M. Stepankov. A Device for the Protection of an Electronic Stabilizer With a Series Connected Control Tube.

Class $21a^3$, 61_{20}. No 109295. N. V. Akchibash. Electromagnetic Relay.

25. Advantages of Plate Modulation System

"Widening the Use of Plate Self-Modulation," by A. I. Voroshin; Moscow, Radiotekhnika, No 3, Mar 58, pp 15-20

At the initiative of the GSPI (State Planning Institute for Ship Building Plants and Work Shops) and the Radio Administration of the Ministry of Communications USSR, a number of short-wave, medium-wave, and long-wave broadcasting stations have been changed to plate modulation transmission.

The following advantages were claimed with the use of this method: the antenna power was raised up to 100%, the over-all efficiency was increased from 20% to 40%, the specific power consumption (per 1 kw of modulation power) was lowered from 4.5 kw to 2.8 kw, and nonlinear distortion was reduced to 3%.

Tubes GU-50 and GU-80 were used in the modulator circuit. The system of plate modulation was found to be most suitable for transmitters of 10-20 kw capacity.

The plate modulation system of N. G. Kruglov is at present very successfully applied to modernization of obsolete grid-modulated broadcasting stations.

The article suggests a still wider utilization of N. G. Kruglov's invention in improving the performance of older broadcasting stations.

26. Conference on Television Broadcasting Problems

"Scientific-Technical Conference on the Problems of Television Development" (unsigned article); Moscow, Radiotekhnika, No 3, Mar 58, pp 76-78

A scientific and technical conference was called in Kiev to discuss the problems of future development of television broadcasting. The conference was timed to the 40th Anniversary of the October Revolution and was sponsored by the Ukrainian Republic and Leningrad Oblast Administrations of the Scientific and Technical Society of Radio Engineering and Electric Communications imeni A. S. Popov.

Prof P. V. Shmakov opened the conference by reporting on the present status of TV broadcasting in the USSR and on the problems of the near future.

The plenary and section sessions were devoted to the problems of TV broadcasting from multiprogram studios, airborne TV relay stations, development of new methods for motion-picture broadcasting, equipment of TV relay stations, recording TV programs, and the application of TV to the industry. It was pointed out that in conjunction with the construction of new TV centers in Moscow and Leningrad, it became imperative to develop a new technology of TV broadcasting and to introduce radical changes in the circuits of the video and audio tracts.

A. M. Lokshin of the State Design Institute, Ministry of Communications USSR, reported that color TV programs will be broadcast on the 12th TV channel. He also mentioned the 400-meter TV tower, the construction of which will begin in Moscow this year.

27. Transistorized Amateur Transmitters

"Transmitter With Semiconductor Triodes," by B. Dem'yanovskiy and V. Lomanovich; Moscow, Radio, No 4, Apr 58, pp 38-40

Soviet industry has begun recently to manufacture the P401, P402, and P403 type diffused junction transistors. The oscillatory frequencies for the P401, P402, and P403 transistors are respectively 30, 60, and 120 Mc. The P401 transistors are used in this telegraph short-wave transmitter. The transmitter is crystal-stabilized and is designed for operations on the amateur band of 20 and 40 meters.

Most of the short-wave antennas with nonsymmetrical feed can be used with this transistorized transmitter. The master oscillator circuit is assembled on one P401 transistor and has negative feedback. The power amplifier utilizes a second P401 transistor. One of the two quartz crystal stabilizers can be connected to the emitter, depending on the operating frequency. The keying of the telegraph signal occurs at the emitter of the oscillator.

The transmitter is designed for operation with a simple quarter-wave antenna or with a traveling-wave type antenna. The transmitter case has the following over-all dimensions 105 X 103 X 73 mm, and it weighs, with power pack, only 700 gr. The power pack consists of storage battery composed of 18 "button" cadmium cells, each 50 milliamp/hr.

28. Computation of Equivalent Parameters of a Nonuniform Earth

"Computation of Equivalent Parameters of a Nonuniform Earth With Calculation of Surface Effect," by P. G. Gorodetskiy; Moscow, Elektrosvyaz', No 4, Apr 58, pp 59-62

"A series of formulas are given for computing the equivalent resistance and inductance of the earth as a return conductor of an axially symmetric system of communication of electromagnetic signals with calculation of surface effect. Nonuniformity of the earth is conditionally computed using a concept of two heterogeneous coaxial layers. The computed formulas are simplified for cases of low and high frequencies.

"Computations similar to those presented in the article, for cases of nonperiodic currents (in the transmission of current pulses), may be carried out on the basis of a general method of computing axially symmetric systems of transmission with calculation of surface effect for nonperiodic currents."

Instruments and Equipment

29. New Induction Potentiometer for Control and Regulating Systems

"An Induction Linear Potentiometer for Industrial Use," by O. I. Aven, S. M. Domanitskiy, and Yu. M. Pul'yer, Moscow, Avtomatika i Telemekhanika, No 3, Mar 58, pp 268-279

An induction potentiometer is described which is designed to replace, in part, slide wires in control and regulating systems and which has a maximum angle of rotor turn of 180° (± 90°).

A diagram of the potentiometer is given showing the construction and division of currents in various portions of the magnetic circuit for a given position.

The construction of the potentiometer, using turns in both the stator and rotor in comparison with those having turns only in the stator, offers a number of advantages, one of which is the possibility of using copper and steel for enclosing the magnetic circuit of the primary and secondary turns for their entire length.

Methods of computation are given which permit the determination of dimensions of the potentiometer, the number of turns and diameter of the wire for the primary and secondary coils, and the values of primary and secondary current and output voltage.

Certain conclusions are reached as a result of experiments with the potentiometer. "The results of current and voltage calculations satisfactorily correspond with experimental data. The characteristics of the potentiometer surpass those of known contactless position-data transmitting units used in industry, in respect to the range of linear characteristics, symmetry, and also the low residual unbalanced potential in the compensation circuit. The use of contactless induction potentiometers will increase the reliability, life, and precision of industrial systems of automatic regulation."

30. Induction Telemetering Device for Measurement of Linear Transference

"Telemetering Compensation Device for Linear Transference," by A. A. Kol'tsov and L. F. Kulikovskiy; Moscow, Avtomatika i Telemekhanika, No 3 Mar 58, pp 280-284

"One of the many possible applications of a ferrodynamic measuring mechanism with independent excitation and rectilinear transference of a moving part is the use of two such measuring mechanisms in series, representing a telemetering device for the measurement of both small and large movements."

The device described was developed by the authors and prepared in the laboratory of the Chair of Automatic, Telemechanic, and Measuring Devices and Equipment of the Kuybyshev Industrial Institute.

A schematic diagram of the instrument and the theory of operation are given.

Experiments conducted with a working model of the device showed a utilization factor of magnetic flux equal to 0.7. Error due to friction for a total coil impedance of 270 ohms was less than 0.5%.

31. Design and Application of Mechanically Controlled Electron Tubes

"Investigation of a new Sensing System of Electrodes for Mechanically Controlled Electron Tubes and Their Use in Acceleration-Data Transmitting Units," by B. V. Yefimov, Aspirant, Leningrad Institute of Precision Mechanics and Optics; Leningrad, Izvestiya Vysshikh Uchebnykh Zavedeniy Priborostroyeniye, No 1, Jan/Feb 58, pp 28-35

A study is made of a new sensing electrode system using a twinbeam triode and having high-current and voltage sensitivity, and experiments on the application of the system in electronic acceleration-data transmitting units are described.

The arrangement consists of two flat anodes between which is placed a thin metallic separator. A metal diaphragm with a slit is placed between the anodes and the cathode and serves the purpose of creating a narrow electron beam in front of the cathode. A transmitting unit with such a system is included in an ordinary bridge circuit.

The experiments were conducted with special tubes with mechanically controlled electrodes, making it possible to change the position of one electrode relative to the other and to change the distance between electrodes.

A group of curves are provided which show the dependence of current and voltage sensitivity and internal impedance on the width of the diaphragm opening and on the distance between anodes and diaphragm. The relationship between voltage sensitivity and internal impedance and diaphragm potential is also shown.

It was found that by decreasing the distance between the anodes and the surface of the diaphragm, higher current sensitivity was obtained, while a decrease in the width of the diaphragm opening caused an increase in the voltage sensitivity.

A three-dimensional electron accelerometer, consisting of three acceleration-data transmitting units, was prepared for measuring the space vector of acceleration in a range up to 100 cm/sec^2 with a period of several seconds. The current sensitivity of this unit after calibration was within the limits of 40-60 microamperes/cm/sec^2.

An accelerometer was also designed for measuring overloads having a gravity acceleration up to 20 g. In this case, a diaphragm opening of 1 mm was used in order to increase voltage sensitivity.

It is suggested that the described system may find application in pressure transducers, linear and angular displacement, frequency vibration, etc.

Components

32. New Voltage-Stabilizing Tubes

"New Stabilitrons," M. Efrussi; Moscow, Radio, No 5, May 58, p 61

The old series of Soviet "stabilitrons" [voltage-stabilizing tubes] designated as SG2S, Sg3S, SG4S, SG1P, and SG2P are utilizing the principle of glow discharge.

In the new type of "stabilitrons" designated SG7S, SG8S and SG9S, the principle of corona discharge is utilized. The envelopes of these new "stabilitrons" are filled with hydrogen at various pressures (16-16.5 mm for SG7S, 80-82 mm for SG8S, and 140-143 mm for SG9S); the pressure of hydrogen is the determining factor of the operating voltage.

In the manufacture of the corona discharge "stabilitrons," a careful processing of the nickel electrodes is required, and the surface smoothness of the anode is particularly important. The precision of geometrical forms and accuracy of spacing is also of prime importance with this type of tube. To assure the latter conditions, molded ceramic insert-spacers are placed at each end of the tube.

In contrast with glow-discharge tubes, the corona-discharge stabilizing tubes have appreciable conductivity (leakage) at voltages below the firing potential; at a voltage of 75% of the operating the leakage current is 0.5-2 microamp. The firing of the corona "stabilitron" does not occur instantaneously upon the application of voltage, but after a period of 15-30 sec.

The characteristics of the "stabilitron" are as follows: the maximum firing potential is 480 v for SG7S, 970 v for SG8S, and 1,320 v for SG9S; the range of operating voltage is 380-400 v for SG7S, 880-920 v for SG8S, and 1,220-1,328 v for SG9S; the range of operating current is 3-100 microamp for SG7S, 3-100 microamp for SG8S, and 10-100 microamp for SG9S; the voltage variation in the range of operating current is 20 v for SG7S, 40 v for SG8S, and 18 v for SG9S; the internal dynamic resistance is 200 kohm for SG7S, 400 kohm for SG8S, and 200 kohm for SG9S; the leakage current is 0.5 microamp (at 300 v) for SG7S, 0.5 microamp (at 700 v) for SG8S, and 2 microamp for SG9S.

Computers and Automation

33. An Introduction to the Concept of Instantaneous Correlation Conversion

"Instantaneous Correlation Conversion," by A. I. Samoylov; Moscow Elektrosvyaz', No 4, Apr 58, pp 3-7

An examination is made of the theoretical possibility of instantaneous correlation conversion, that is, a method by which correlation functions may be obtained at a speed equal to the input speed of the initial process.

Although storage tubes with double targets and two beams would be more suitable for use in the "correlator," there is no practical means of combining the trajectories of the scanning and recording beams. Therefore, a description is given of a correlator designed for operation with singlebeam storage tubes. A schematic diagram of the correlator and the processes which take place within the correlator are also shown.

"Instantaneous correlation conversion, as suggested in the article, is not an abstraction, but is a completely real and helpful technical device. It permits rapid determination of correlation functions and, consequently, an effective study of random processes. The author intends to show in the future that instantaneous correlation conversion permits a separation of signals according to their shape, which will open further possibilities in attempts to increase the amount of information per unit volume.

In conclusion, it is noted that the correlator described is, as is easily proven, an ideal receiver according to the concepts of Kotel'nik and Kharkevich."

34. Structure and Methods of Analysis and Synthesis of Combiner Mechanisms

"The Theory of the Structure of Combiner Mechanisms," by S. M. Yakovlev; Moscow Avtomatika i Telemekhanika, No 3, Mar 58, pp 221-227

Despite the wide application of combiner mechanisms in such fields as telegraphy, telemechanics, and the textile industry, "there has been until recently such a lack of systematic theory on their structure that analysis and synthesis have become extremely complicated."

In this article, results are given of research performed in 1948 and 1949 on the structure of combiner mechanisms and methods of analysis and synthesis on the basis of Boolean algebra.

The principle of operation of two-position mechanisms, such as those used in the ST-35 and "Krid" telegraphic apparatus and more complicated multistage mechanisms, is examined, and an algebraic analysis of their structure with specific examples is given.

Materials

35. Graphical Methods for Computing Quiescent Points of Emitter Repeaters

"Graphic Analysis of Heat Stabilization of Emitter Repeaters," by V. S. Davydov; Moscow, Radiotekhnika, No 2, Feb 58, pp 23-27

"Methods for the graphic analysis of emitter repeaters [stages having a common collector] using junction transistors are presented which make it possible to determine, according to a group of statistical characteristics, the effect of circuit elements on the position of the quiescent point and the change of input impedance during temperature fluctuations.

"A comparison is made of the properties of five different variations of emitter repeaters, and recommendations are given for computing heat stabilized stages with low noise levels."

A rational choice of circuits was found to depend on the temperature range and on the maximum permissible values of input impedance and noise coefficient.

It is concluded that transistors may be classified into subgroups with standard characteristics for the purpose of performing graphical computations.

36. Scintillator Crystals for the Measurement of Spectra of Gamma Rays, Neutrons, and Charged Particles

"Measurement of Gamma Rays and Neutron Spectra With CsI(Tl), NaI(Tl), and Stilbene Crystals" by N. G. Afanas'yev and V. Yu. Gonchar; Moscow, Atomnaya Energiya, Vol 4 No 3, Mar 58 pp 289-292

A 55-channel pulse analyzer developed by the authors of the article in 1954 is described, which is similar to that developed by G. W. Hutchinson and G. G. Scarott (Philosophical Magazine, Vol 42, 1951, p 792). With the aid of this analyzer, the properties of photomultipliers and scintillator crystals can be investigated rapidly. Using this analyzer, a newly developed amplifier circuit, and stabilized feeding of the photomultiplier, measurements of spectra were made with a CsI(Tl) scintillator crystal prepared by the Institute of Crystallography, Academy of Sciences USSR, and NaI(Tl) and stilbene crystals prepared by the Khar'kov Chemical Reagent Plant. The crystals used had a diameter of 3 cm and were about 2 cm high. On the basis of the determinations which were carried out, it is concluded that the scintillation spectrometer which has been developed is suitable for the measurement of spectra of gamma-radiation, neutrons, and charged particles. Stilbene was used in the measurement of neutron spectra.

[For additional information on electronics materials, see Item No 90.]

Miscellaneous

37. New Radiophysics and Electronics Institute in Siberia

"Institute of Radiophysics and Electronics of the West Siberian Affiliate of the Academy of Sciences USSR," by Yu. B. Rumer; Novosibirsk, Izvestiya Vostochnykh Filialov Akademii Nauk SSSR, No 1, 1957, p 141

"The existing Department of Technical Physics, under the West Siberian Affiliate of the Academy of Sciences USSR, has been reorganized by the decree of the Presidium of the Academy of Sciences USSR, beginning 1 January 1957, into the Institute of Radiophysics and Electronics and will comprise the following laboratories: theoretical physics, electronic phenomena at super-high frequencies, cathode electronics, physics of gas discharge, and semiconductors.

"The organization of such an institute answers the long-standing needs of the specialized branches of West Siberian industry.

"The existence of large industrial scientific research institutes, plant laboratories, and design bureaus in West Siberia requires the coordination of work in the field of radio engineering, for which the responsibility will be assumed by the new institute.

"The objective of scientific activities of such an institute will consist in solving a number of actual problems in radio-electronics, in applying new physical principles for the development of electronic-industrial instruments, and in developing mathematical methods applicable to electrodynamics.

"Similar investigations will be conducted in close contact and business-like association with the leading institutes of the Academy of Sciences USSR and the scientific research collectives of Western Siberia.

"Let us discuss in brief the most important endeavors of the present time in the institute and the results achieved.

"1. A group of theoreticians, in cooperation with one of the scientific-research institutes of the Ministry of the Radio Engineering Industry, was engaged in studying the optimum linear antennas and achieved substantial gains in this field. In the future, the group of theoreticians (the laboratory of theoretical physics) will be engaged in the development of new mathematical methods useful to advanced applied electrodynamics (waveguides, the interaction processes of electron streams with the electromagnetic fields).

"2. Investigations in the field of cathode electronics permitted the practical adaptation of a new type of cathode to the thermionic emission. In 1957, research investigations will continue to develop the new sources of thermo-electrons.

"3. The study of electronic phenomena at super-high frequencies was conducted with the aim to develop a scientific-technical basis for power electronics. Further efforts on the part of the scientific personnel of the SHF electronic-phenomena laboratory will be directed toward the development of powerful electronic oscillators and expansion of the field of application of the SHF electronics.

"4. In the field of physics of gas discharge, special attention was given to the investigation of new effective methods of discharge current control.

"The scientific workers have recently developed a new gas-discharge device for effective switching of current, useful for automation and telemechanics.

"In 1957, investigations will continue on the peculiarities of the prefiring phenomenon during the discharges in the gas.

"All of these scientific orientations and the achievements are gainfully related to the practical interests of Western Siberia industry. Thir will serve as a real basis for the successful activity of the newly organized Institute of Radio Engineering and Electronics."

V. ENGINEERING

38. Stability of Swept Wing

"On Calculating the Stability of a Swept Wing of Monolithic Design," by M. B. Vakhitov, Chair of Structural Mechanics of Aircraft, Kazan Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan/Mar 58, pp 61-68

The article is devoted to the calculation of the total stability of swept wings of monolithic design with reinforcing ribs -- stringers and belts of ribs -- in the direction of sweep and in the direction of flight.

The wing has thick upper and lower skin, which is capable of absorbing both normal and tangential stresses, which vary according to the depth of the skin.

The inside of the wing is filled with continuous walls of longerons distributed along the chord and continuous walls of ribs distributed along the span. Both are under sheer stress from tangential forces and are not susceptible to other forces. The reinforcing ribs are flexible filaments subject only to axial load. The thickness of the wing varies smoothly.

First, the differential equations are derived for the lateral flexure of the swept wing; then the calculation is given for a wing with constant cross section.

39. Deformation of Sandwich Plates and Shells

"Equations of Sloping Three-Ply Shells with Light-Weight Filler During Finite Deflections," by V. F. Karavanov, Chair of Strength of Materials, Moscow Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan-Mar 58, pp 68-77

This work represents a generalization of the solution of E. Reissner (Journal of Aeronautical Sciences, Vol 15, No 7, 1948, pp 435-440; Vol 17, No 2, 1950, p 125) on finite deformations of rectangular three-ply sandwich plates on sloping three-ply shells. It presents a derivation of the equations of sloping three-ply shells with light-weight filler during finite deformations of the middle surface of the supporting layers, whereby the filler sustains slight deformation. It is assumed that the thin isotropic supporting surfaces comply with the Kirchhoff-Lyav hypothesis. The filler is considered light, elastic, and isotropic. The thickness of the supporting layers in respect to the entire thickness of the three-ply

shell is assumed to be small. In the derivation of the formulas, the internal bending strength of the supporting layers is not taken into account, and in the filler is assumed in regard to only lateral flexure and deformation from lateral compression. In the remote terms, the dependence of the deformation of the filler on lateral compression is neglected.

40. Energy Reserve of Aircraft During Landing

"The Motion of an Aircraft Before Landing and Its Energy Reserve, With a Calculation of the Bending of the Wing," by Z. A. Melik-Sarkisyan, Chair of the Construction and Designing of Aircraft, Moscow Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan-Mar 58, pp 78-86

In manuals and other publications, it is recommended that the cushioning effect of the landing gear, the energy reserve of an aircraft at the moment of landing, the so-called "rated work," be determined as a kinetic energy of a vertical motion:

$$A_N = \frac{M_{red} V_y^2}{2},$$

where M_{red} = the reduced mass of the aircraft, and V_y = the vertical velocity. It is recommended that the vertical velocity be determined by means of the formula:

$$V_y = \sqrt{AV_{post} + BG^{0.5} + C.}$$

In the article, a comparison of the vertical velocity of a parachuting from an altitude of one meter and a linear high-speed descent from a height of 3 meters is illustrated graphically. The velocity determined according to the recommended formula greatly exceeds the velocity during a parachuting, especially as the specific load on the wing increases. Although the velocity values obtained with the recommended formula may occur during a high-speed landing, such a coincidence is only accidental.

In the information on the calculation of the cushioning action of the landing gear, it is recommended that the "coefficient of weighability" $\chi = 1 - \frac{Y_g}{G}$, which represents that portion of the weight of the aircraft not unbalanced by the lifting force, be taken equal to 0.25, regardless of the characteristic of the aircraft and the character of the landing. Actual values of the "coefficient of weighability" are given in graphic form.

From graphs of the dependence of β_T on the characteristic of the aircraft, it is evident that, during parachuting, β does not attain a value of 0.25, even for an aerodynamically imperfect aircraft. For modern aircraft ($v \leqslant 0.04 \frac{1}{sec}$) β does not exceed 0.15 at the moment of landing and is variable with time. During a high-speed landing, this coefficient is constant, but at real angles of incidence the trajectories are near zero or even negative.

The actual energy reserve of an aircraft at the moment of landing is made up of the three forms of energy (potential energy of the surface and kinetic and internal energy of the wing) and sharply differs from the value determined in accordance with the recommended formula.

The qualitative and quantitative divergences of the recommendations from actual conditions are also illustrated graphically.

41. Internal Losses in Chamber of Liquid Rocket Engine

"The Estimation of Internal Losses in the Combustion Chamber of a Liquid Rocket Engine," by A. V. Kvasnikov, Chair of Aircraft Engines-2, Moscow Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan-Mar 58, pp 95-105

The article suggests a method of computing the losses of thrust of a liquid rocket engine. This method, which is based on the use of a thermodynamic calculation and an ordinary experimental determination, was originally devised by M. V. Mel'nikov, who brought the results of experimentation into agreement with theory under extremely simplified conditions.

The determinations of coefficients, which are used in the article according to their own physical sense, enter into a series of determinations which are accepted in heat engineering, and the connections established between them permit a more accurate determination of the balance of losses.

42. Roughened Surface for Increased Heat Exchange

"The Use of a Roughened Surface in Heat Exchangers for the Purpose of Reducing the Weight of a Heat Exchanger," by A. A. Seleznev, Chair of Heat Engines, Kazan Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan-Mar 58, pp 106-112

The calculations in the article demonstrate that a roughened surface may be used in place of smooth tubes in order to increase the rate of heat exchange and thereby obtain a heat exchanger with comparatively less bulk (weight). A formula is given which expresses the relative decrease of heat-exchanger dimensions for various degrees of roughness and for various operating conditions, depending on the value of the Reynolds criterion. An expression is also given for the relative increase of power expenditure necessary to overcome the greater (air) resistance.

A decrease of heat-exchanger dimensions is possible through an intensification of the heat exchange as a result of increasing the value of the Reynolds criterion. The power expenditures in such a case, however, are increased considerably more than when surface roughness is used. Consequently, it is economically more profitable to use a roughened surface than to increase the value of the Reynolds criterion.

43. Frontal Thrust and Minimum Cross Sections in Turbo-Jet

"The Compression Ratio of a Compressor Which Guarantees Minimal Cross-Sectional Dimensions of a Turbo-Jet Engine," by V. K. Shchukin, Chair of Heat Engines, Kazan Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan-Mar 58, pp 113-125

The article demonstrates the fact that the cross-sectional dimensions of an engine can be estimated conveniently by means of one specific parameter -- the frontal thrust.

The frontal thrust of the combustion chamber is computed for a velocity of 40 m/sec. If, under these conditions, the frontal thrust determined for the combustion chamber is less than the frontal thrust for other components, the velocity is increased until the frontal thrust of the combustion chamber equals that of the engine. The calculation is carried out on the assumption that a complete expansion of gases takes place in the jet nozzle. If the frontal thrust at the jet nozzle is lower than at the rest of the components, the diameter of the exit cross section is decreased until it conforms with the maximum diameter of the engine.

The values of the frontal thrust for the various components and for the engine as a whole are determined for flight conditions at design speed and an altitude of 11 kilometers. For the sake of comparison, the compression ratio is reduced to takeoff conditions. The connection between the compression ratio at takeoff and during flight is determined for adiabatic compression. The work expenditure for the cooling of the turbine is not taken into account.

The graphic illustrations in the article show that the optimal compression ratio in respect to frontal thrust has an intermediate value between the optimal compression ratio in respect to specific thrust and the optimal compression ratio in respect to specific fuel consumption.

44. More Accurate Determination of Twist of Flexible Shafts

"Twisting of Flexible Circular Shafts by Distributed Loads," by S. A. Bakanov, Chair of Design of Aircraft Engines, Moscow Aviation Institute; Kazan, Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika, No 1, Jan-Mar 58, pp 126-132

The article points out that, although often encountered in machine building, the problem of the twisting of shafts by distributed loads has not yet been solved. The traditional determination of the stress and deformation of such shafts is by means of formulas derived for the twisting of flexible shafts by two moments. The article shows that the actual distribution of the stress in such shafts differs considerably from the purely tortional stresses ("net twist").

Although the ideal example for such a loading condition is hard to find, it is reasonably approximated, according to the article, in the case of clamped connections and ordinary slotted shafts, with either internal or external slots.

The work described in the article was done because of the necessity of working out a more accurate solution of the problem.

45. Seventy Yugoslav Engineers Graduated

"New Architectural and Construction Engineers", by G. J.; Sarajevo, Oslobodjenje, 6 Apr 58, p 14

Seventy new architectural and construction engineers were graduated on 5 April 1958 at the University of Sarajevo in the auditorium of the Technological Faculty.

Attending the graduation ceremony were Engr Milan Potkonjak, Deputy Rector of the University; Prof Dr Dusan Krsmanovic, Dean of the Technological Faculty; deans of the other faculties; and others.

The majority of the graduates completed their studies during the past 6 years.

Graduates were as follows:

Architectonic Department	Construction Department
Dusko Kondic	Nadezda Kures
Branislav Krstic	Cedomila Joksimovic
Sefkija Dreca	Mesud Jamakovic
Vera Cemalovic	Predrag Ljoljic
Vladimir Dimitrijevic	Fikret Bajric
Dragoljub Markovic	Jozo Stapic
Vladimir Pejcinovic	Mladen Kozomara
Branko Bulic	Branko Dekic
Zlata Babajic	Mugdim Hadziahmetovic
Bozidar Curic	Srecko Dujmovic
Nedzad Hadziosmanovic	Ranko Smiljanic
Sidika Karamehmedovic	Nadezda Knezevic
Borivoj Mileusnic	Milenko Urta
Valentin Salajev	Safet Memisevic
Darinka Stavlic	Josip Papa
Nevenka Vragolov	Nenad Dragicevic
Slavko Oljaca	Hamdija Zigic
Milan Kusan	Mithat Aganovic
David Finci	Zvonimir Majsner

Architectonic Department	Construction Department
Cvetko Brajovic	Drasko Sosic
Zivojin Vekic	Anton Anic
Zlata Nuhbegovic-Salihbegovic	Branko Bjelogrlic
Zlatiborka Radovic	Zarko Bobrijevic
Elena Lalic-Zaharovic	Branko Krpan
Vera Kovacevic	Velimir Novakovic
Smiljka Janjusevic	Smail Smailbegovic
Radovan Grgic	Ante Trogrlic
Ferid Barjaktarevic	Ivan Zilic
Nedzad Hotic	Nusret Duric
Dragoljub Micovic	Dragoljub Lazic
Josip Felanda	Salko Aljovic
Gorcin Jovanovic	Munir Gavrankapetanovic
Ethem Hadzihasanovic	Vjekoslav Vlasic
Ante Scarpa	Sabrija Secic
	Relja Mijic
	Zdravko Subasic

46. Sarajevo Technological Faculty Criticized

"Discussion of Studies in the Sarajevo Technological Faculty," by B. M.; Zagreb, Borba, 3 Apr 58, p 5

At a special assembly of the Association of Students of the Technological Faculty (Udruzenje studenata Tehnickog fakulteta) in Sarajevo, members discussed the length of studies, the problems of holding instruction, the attitude of students toward their studies, and their financial status and the cost of studies.

The assembly was also attended by Grujo Novakovic, a member of the Executive Council of Bosnia-Hercegovina; Nijaz Dizdarevic, member of the Central Committee of the Association of Communists of Bosnia-Hercegovina (Centralni komitet Saveza komunista Bosne i Hercegovine); and Dr Ethem Camo, rector of the University of Sarajevo.

It was brought out that studies in the Construction Department are 6 years and 11 months in duration, and studies in the Architectonic Department are 6 years and 4 months in duration.

It was revealed in a survey that was taken in the faculty that studies in the Construction Department, in accordance with the existing program and organization of theoretical and practical instruction, cannot be less than 6 years and 3 months, and studies in the Architectonic Department cannot be less than 5 years and 8 months in duration.

Individual subjects are too extensive, certain subjects do not include current material from the field which is needed by engineers in the present-day economy, and theoretical instruction in certain subjects has not been coordinated with exercises.

It was revealed in the discussion that greater student interest can be achieved by improving the organization of instruction, by certain modification of the instruction program, and by better coordination of theoretical and practical instruction.

VI. MATHEMATICS

47. Fourier Series Solutions for Radial and Axial Displacements of an Elastic Cylinder of Finite Dimensions Under the Influence of Given Forces

"Concerning the Equilibrium of an Elastic Cylinder of Finite Dimensions," by S. B. Pliyev, Institute of Physics and Mathematics; Baku, Doklady Akademii Nauk Azerbaydzhanskoy SSR, Vol 13, No 8, 1957, pp 837-841

In the work, several cases of an exact solution of the problem concerning the equilibrium of a cylinder under the action of given forces on the lateral surface and normal pressures on the ends are considered.

A circular cylinder of length 2ℓ and with a cross sectional radius equal to a (in the case of a hollow cylinder the interior and exterior radii of which are respectively b and a) is placed under the action of external loads symmetrical to the axis of rotation.

The differential equations for the radial and axial displacements, u and w, respectively, were expressed in the form

$$\frac{\partial^4 u}{\partial z^4} + 2D^2 \frac{\partial^2 u}{\partial z^2} + D^2 D^2 u = 0;$$

$$\frac{\partial^4 w}{\partial z^4} + 2D \frac{\partial^3 w}{\partial r \partial z^2} + \left(D \frac{\partial}{\partial r}\right)^2 w = 0.$$

To determine the stress in the considered body, it was necessary to find functions u and w satisfying the above equations and the boundary conditions

when $z = \pm\ell$, $\tau = 0$, $\sigma_z = \Phi(r)$; and

when $r = a$ (on the lateral surface) $\tau = 0$, $\sigma_r = F(z)$.

The solutions of these equations were found in the form of a Fourier series.

48. Paper Presented at the Third All-Union Mathematical Conference Concerning the Approximate Solution of Partial Differential Equations

"On Certain Methods for the Solution of Equations in Partial Derivatives," by Yu. V. Blagoveshchenskiy; Kiev, Trudy Tret'yevo Vsesoyuznovo Matematicheskovo S'yezda (Works of the Third All-Union Mathematical Conference), Vol 1, 1956, p 192

This work presents several methods for the approximate solution of partial differential equations. A method of point-wise joining of a region is considered upon using known Green's functions for the problem in finite differences concerning joined regions.

A method is developed for increasing the accuracy of solutions for problems worked on the EGDA integrator. Effective methods for constructing conformal transformations and several methods for solving problems with a large number of unknowns for homogeneous and nonhomogeneous boundary value problems are developed.

49. Inadequacy of Method of Characteristic Exponents When Applied to Nonlinear Equations

"The Inadequacy of the Method of Characteristic Exponents When Applied to Nonlinear Equations," by R. E. Vinograd, Moscow Aviation Institute; Moscow, Doklady Akademii Nauk SSSR, 1957, Vol 114, No 2, pp 239-240

A system of n differential equations having the vector form

$$dx/dt = F(t,x), \qquad (1)$$

is considered for which $F(t,0)$ is identically equal to zero and the Lipschitz condition $\left| F(t,x_1) - F(t, x_2) \right| \leq K \left| x_1 - x_2 \right|$ is satisfied.

From the known estimate of the norms of the solutions under these conditions, i.e.,

$\left| x(t) \right| \leq \left| x(0) \right| e^{kt}$, it follows that the characteristic exponents of all solutions are bounded:

$$\lambda = \overline{\lim_{t \to \infty}} \, t^{-1} \ln \left| x(t) \right| \leq K,$$

and for that reason the relation

$\sup \lambda = \Lambda \leq K$ holds. It is also known from

the work of A. M. Lyapunov, "Obshchaya zadacha ob ustoychivosti dvizheniya, 1950, ("The General Problem of Stability of Motion, 1950), that in the case of the linear system (1), that is, when $F(t,x) = A(t)x$, the following assertion is true.

For any $\epsilon > 0$, there exists a constant B_ϵ, which is the same for all the equations, such that

$$|x(t)| \leq |x(0)| \; B_\epsilon \; e^{(\Lambda + \epsilon)t}. \tag{2}$$

In the nonlinear case from the determinations of λ and Λ, an inequality of the form (2) also follows in which, however, B_ϵ depends on the choice of the solution $x(t)$, or which is the same thing, on the initial point $x(0)$.

The question arises, is it possible to choose a B_ϵ not depending on $x(0)$ in the nonlinear case?

A priori, the inequality (2) may be upset in two ways.

(a) B_ϵ exists for each sphere $|x(0)| = r < R$ but increases without bound as $r \to 0$ (or $r \to \infty$).

(b) B_ϵ does not exist for any sphere (since its existence for $r = r_0$ follows from the existence of B_ϵ for $r < r_0$).

Case (a) still leaves a possibility for using the number Λ; thus, the following theorem holds:

Theorem 1. In case (a), from the fact that Λ is negative, an asymtotic stability of the trivial solution $x = 0$ of system (1) follows.

In case (b), however, the method of characteristic exponents proves to be inadequate for investigation of the solutions for system (1) in the sense that this is done in the case of a system of linear equations or, for example, from the condition $\Lambda < 0$, a general stability of the solution $x = 0$ does not follow.

Following the above introduction, two examples were given showing that both cases are actually encountered and more over are independent of t in the right side of (1).

50. Method for Calculating Nonlinear Oscillations With One Degree of Freedom of System With Slowly Varying Parameters for Arbitrary Value of t in an Interval of Time Having the Order $1/\epsilon$

"Concerning Nonlinear Oscillations With One Degree of Freedom of a System With Slowly Varying Parameters," by V. M. Volosov, Moscow State University imeni M. V. Lomonosov, Moscow, Doklady Akademii Nauk SSSR, Vol 117, No 6, 1957, pp 927-930

In the previous works of the author, which appeared in Doklady Akademii Nauk SSSR, Vol 106, No 1, 1956; Doklady Akademii Nauk SSSR, Vol 114, No 6, 1957; and Doklady Akademii Nauk SSSR, Vol 115, No 1, 1957, an oscillating solution of the equation

$$(1) \qquad \ddot{x} + Q(\epsilon t, x) + \epsilon f(\epsilon, \epsilon t, x, \dot{x}) = 0, \qquad |\epsilon| \ll 1$$

was investigated where Q and ϵ f were respectively interpreted as a slowly varying (in view of the presence of the small factor ϵ of the argument t) fundamental force causing an oscillatory motion and a small perturbing force depending on the velocity $\dot{x}$. In the work which appeared in Doklady Akademii Nauk SSSR, Vol 106, No 1, 1956, equation (1) was presented in the form

$$d/dt \left[m(\epsilon t) \dot{x} \right] + \epsilon f + Q = 0$$ where $m(\epsilon t)$ is a slowly varying mass. It was shown that under the condition that sign Q equals sign x, which determines the oscillatory character of the solution, and several other bounds, the solution of (1), satisfying the initial conditions $x(0) = x_0$ and $\dot{x}(0) = \dot{x}_0$ $(x_0^2 + \dot{x}_0^2 \neq 0)$, oscillates about the position equilibrium $x = 0$ with a slowly varying amplitude and period, for which formulas were obtained determining these quantities with an accuracy of order ϵ throughout the interval $t \sim 1/\epsilon$.

The amplitude of the oscillation is described by two amplitude curves

$$F_1(\epsilon t, \epsilon) \equiv F_{10}(\epsilon t) + \epsilon F_{11}(\epsilon t),$$

$$F_2(\epsilon t, \epsilon) \equiv F_{20}(\epsilon t) + \epsilon F_{21}(\epsilon t),$$ which

the maximum and minimum solutions, respectively, approach as ϵ approaches zero.

The functions $F_{10}(\epsilon t)$ and $F_{20}(\epsilon t)$ are null approximations of the amplitude, describing the maximum and minimum of the solution with an error $\sim \epsilon$ on the interval $t \sim 1/\epsilon$. The quantities $\epsilon F_{11}(\epsilon t)$ and

$\epsilon F_{21}(\epsilon t)$ are the corrections to the null approximation of the amplitude, and $F_1(\epsilon, \epsilon t)$ and $F_2(\epsilon, \epsilon t)$ are the first approximations, describing the amplitude with an accuracy up to ϵ inclusively. Equations were derived for $F_{kj}(\epsilon t)$ $(k = 1,2;\ j = 0,1)$ in the works of the author mentioned above, determining these quantities as slow functions of time t which we will not explicitly write out again. The period of oscillation was determined in the above works as the time between two neighboring maximums or minimums.

The period is determined with the help of the function

$$T(\epsilon t, \epsilon) \equiv T_0(\epsilon t, F_{10}, F_{20}) + \epsilon T_1(\epsilon t, F_{10}, F_{20}, F_{11}, F_{21}),$$

where expressions for T_0 and T_1 were given in the original but their complexity prohibits their presentation here.

$F_{kj} = F_{kj}(\epsilon t)$ $(k = 1, 2;\ j = 1, 0)$ are approximations for the amplitude.

For an arbitrary value of t within the limits of the considered period, the quantity T_0 is the null approximation of the period determining it with an error $\sim \epsilon$, while ϵt_1 is the correction to the null approximation. Thus $T = T_0 + \epsilon T_1$ is the first approximation of the period and determines it with an accuracy up to ϵ inclusively if we set $t = \Theta$ in the summand of T_0 where Θ is the middle of the considered period. The method of the author presented in the works mentioned above permits one to calculate the period and amplitude to any greater desired accuracy.

Knowing the amplitude and period of the solution of (1) does not make it immediately possible to calculate the value of the solution $x(t, \epsilon)$ for an arbitrary value of t in an interval of time having the order $1/\epsilon$.

This particular problem is solved in the present work. Here a formula for the solution of (1) is derived, which determines it with an accuracy ϵ. The methods developed permit one to calculate the solution with an accuracy greater than any previously assigned accuracy. The problem was proposed to the author by A. N. Tikhonov.

VII. MEDICINE

Contagious Diseases

51. Bacteremia in Brucellosis

"Certain Characteristics of Bacteremia in Brucellosis," by B. G. Khaykina and A. A. Uvarov, Orenburgskiy Medical Institute; Moscow, Sovetskaya Meditsina, Vol 22, No 3, Mar 58, pp 28-32

The objective of the research described in this article was to determine the characteristics of bacteremia which reflect the relationship existing between the brucellosis pathogen and the human organism in the process of its evolution and the relationships which arise during the development of infection in each individual organism. The dynamics of bacteremia during development of the infection process and the relationship between bacteremia and clinical and immunological manifestations of this process were also investigated. Patients in the decompensation stage of acute, subacute, and chronic forms of brucellosis were observed. Numerous bacteriological and serological tests were performed, including seedings of blood on solid culture media. All cultures isolated were identified as Br. melitensis. The following tables are included: (1) Intensity of Bacteremia According to Results of Multiple Blood Cultures. (2) Isolation of Brucella in Relation to the Pattern of the Process and the Average Temperature (in percent). (3) Bacteremia and Antibody Titer.

Conclusions based on the results of these experiments are as follows:

"1. The frequency of isolating Brucella from the blood decreases in proportion to the duration of the disease. Brucella are isolated in 25% of the patients during the 6-9-month period in chronic brucellosis, and after one year in extremely rare instances.

"2. Acute septic forms of brucellosis with severe bacteremia can proceed with normal temperatures.

"3. In the early stages of the disease, the organism has the capacity to localize the process and to limit the deposition of Brucella in the blood.

"4. Clinical compensation of the process frequently begins before bacteremia disappears.

"The status of bacterial localization can be determined most precisely by the antibody titer.

"5. Data were obtained which indicate the possibility of a severe course of brucellosis following infection from goats."

52. Clinical Picture of Q Fever

"Clinical Manifestations of Q Fever in Stalinabad," by D. M. Khashimov and Sh. M. Ostrovslaya, Chair of Infectious Diseases, Stalinabad Medical Institute imeni Avicenna; Moscow, Sovetskaya Meditsina, Vol 22, No 3, Mar 58, pp 33-37

A complete report on 108 sporadic cases of Q fever which entered Stalinabad Hospital of Infectious Diseases during the last 50 years is presented in this article. On the basis of variation in clinical manifestations, the disease was differentiated into three forms: typhoid-like, influenza-like, and pulmonary. Q fever had been verified by laboratory tests in all cases (agglutination, complement fixation reactions, and intraperitoneal infection of guinea pigs with patients' blood). The clinical picture of these three forms is described in detail. Conclusions based on the results of these observations are as follows:

"1. In view of the diverse clinical manifestations of Q fever, it will be expedient to differentiate this disease conditionally into three forms according to these manifestations pending final classification: typhoid-like, influenza-like, and pulmonary.

"2. In addition to a severe course with pronounced intoxication of the central nervous system (delirium, motor excitation, soporific condition, and meningeal phenomena), Q fever can have a mild course with a brief febrile period. Consequently, all patients with a 2-3-day fever of unknown etiology should be examined for Q fever, even under ambulatory conditions.

"3. Further, more intensive study is necessary to characterize definite forms of the disease clearly."

53. Chinese Report Case of Septicemia Due to Bacillus Mallei

"Report of a Case of Septicemia Due to Bacillus Mallei," by Chang Hsi-en (張希恩) and Ts'ao Shou-jen (曹守仁), Ch'i-ch'i-ha-erh First Municipal Hospital; Peiping, Chung-hua I-hsueh Tsa-chih (National Medical Journal of China), Vol 44, No 2, 1958, p 195

This item reports a case of pyemia which was treated at the hospital with penicillin and streptomycin, no other antibiotic being available at the time (April 1957). The patient died 80 hours after admittance.

Subsequently, the causative agent was identified culturally as Bacillus mallei. The final diagnosis of septicemia due to Bacillus mallei was confirmed through biological experiments.

54. Incidence of Contagious Disease Reduced in Hungary

"About the Prevention of Disease and the Conquest of Epidemics," by Zoltan Gesztelyi Nagy; Budapest, Esti Hirlap, 29 Oct 57, p 3

In an interview with the author, Dr Gyula Vilmon, Deputy Minister of Health, stated that although little is spoken of the subject, measles and infectious hepatitis are still a far greater cause for concern in Hungary than many of the more common contagious diseases.

The incidence of diphtheria has dropped from 20,000 cases with 15,000 deaths in 1930 to 883 cases and 13 deaths in 1956. In 1956 there were 748 cases of typhoid, 14 of which were fatal; whereas in 1931, the figures were 8,651 and 1,045, respectively.

In 1945, there were 3,500 cases of typhus fever as compared with 3 in 1955, 14 in 1956, and 5 in 1957. In 1956, there were only 32 cases of malaria, and this number was reduced to 14 in 1957.

The public health epidemiological stations were established in 1954. Now city and jaras health groups are being organized. Every institution is to have trained medical assistants and public health inspectors. By the end of 1957, there will be 400 health inspectors in Hungary. Physicians who participate in public health work are required to take a special course in medical hygiene. So far, 882 physicians have completed such a course.

Hungary also plans to train special sanitary engineers who will inspect and pass judgment on building sites, shop hygiene, the purity of drinking water, etc.

Epidemiology

55. Role of the Aedes Mosquito in the Transmission of Tularemia

"The Significance of the Mosquito of the Genus Aedes in the Transmission of Tularemia in Kharkovskaya Oblast," by M. F. Shmuter and Ye. M. Lavrenko, Ukranian Scientific Research Institute of Malaria and Medical Parasitology; Moscow, Meditsinskaya Parazitologiya i Parazitarnyye Bolezni, No 2, Mar/Apr 58, p 220

The role of various species of Aedes in the transmission of tularemia was investigated in the laboratory. The experiments indicated that the tularemia infection was maintained in the organism of Ae. maculetus and Ae. dorsalis up to 4 days; in Ae. flavescens, 5 days; and in Ae. cinereus, 9 days. This is the first time that this has been demonstrated experimentally. In addition, virulent bacteria were isolated from feces emulsions of the Ae. vexans and Ae. cinereus 6 days after infection.

56. Ticks of the Mayminskiy Focus of Tick-Borne Encephalitis

"Tick Fauna in the Mayminskiy Focus of Spring-Summer (Tick-Borne) Encephalitis," by P. V. Semenov, Altayskiy Kray Scientific Research Veterinary Experimental Station; Moscow, Meditsinskaya Parazitologiya i Parazitarnyye Bolezni, No 2, Mar/Apr 58, p 222

The following ticks were found to inhabit the Mayminskiy focus; Dermacentor silvarum, D. pictus, Haemaphysalis concinna, Ixodes persulcatus, and I. apronophorus. During 1953, the maximum incidence of tick-borne encephalitis was noted in May (28.5%) and June (55.1%).

57. Controlling the Vector of Tick-Borne Encephalitis in Kemerovskaya Oblast

"Three Years of Experience in the Control of the Vectors of Tick-Borne Encephalitis in Kemerovskaya Oblast (1955-1957)," by V. A. Nabokov, M. A. Laryukhin, I. A. Tarabukhin, N. F. Chumak, and Ye. D. Chigirik, Institute of Malaria, Medical Parasitology, and Helminthology; Moscow, Meditsinskaya Parazitologiya i Parazitarnyye Bolezni, No 2, Mar/Apr 58, pp 199-207

In addition to the mechanical spraying systems developed by P. G. Sergeyev and V. A. Nabokov, the AN-2 and PO-2A airplanes and the MI-4 helicopter were used during the past 3 years to spray DDT and hexachlorane

in various areas of Kemerovskaya Oblast to control Ix. persulcatus, a vector of tick-borne encephalitis. As a result of data collected, 20 kg of hexachlorane is considered the minimum effective dosage for one hectare; however, to ensure a 20-kg dose, 50 kg is sprayed. Biological tests conducted in the area treated by an MI-4 helicopter spraying 30 kg of 12% hexachlorane dust per hectare confirmed the effectiveness of this method since the helicopter can operate at a much lower speed than airplanes.

58. Chinese Study Outbreak of Hemorrhagic Fever in Manchuria

"Clinical Analysis of 36 Cases of Epidemic Hemorrhagic Fever," by Wang Pu-yun (王 步 云) and Liu P'ei-ch'in (刘 培 芹), Department of Communicable Diseases, First Military Medical University; Peiping, Chung-hua I-hsueh Tsa-chih (National Medical Journal of China), Vol 44, No 2, 1958

This article presents a clinical analysis of 36 cases of epidemic hemorrhagic fever which occurred in and nearby "a certain forested area in Manchuria" during 1954-1955. All but six cases were male. Fourteen became ill in a rural area where there was no previous report of hemorrhagic fever. The rest either lived or worked in the woods. Clinical manifestations during the various stages of the disease are discussed.

59. State of Chinese Research on Epidemic Influenza

"State of Research on Influenza Epidemics in China," by Chu Chi-ming (朱 既 明), Ch'ang-ch'un Biologicals Research Institute (长春生物制品研究所); Peiping, Chung-hua I-hsueh Tsa Chih (National Medical Journal of China), Vol 44, No 2, 1958, pp 117-125

This article is developed under two main section headings: (1) Studies undertaken during the period 1952-1956 on the epidemiology, etiology, and other considerations; and (2) On some epidemiological problems of the 1957 influenza epidemic. The paper concludes with a five-point suggestion for future Chinese research.

The author states that this paper was read at the Conference on Epidemic Influenza Research Work which met in Peiping in July 1957. His bibliographic citations include many published and unpublished Chinese reports.

Hematology

60. Asymmetry Evident in Leukocyte Count and Phagocytic Activity During Unilateral Inflammations of the Nervous System

"Asymmetry of Leukocyte Count and Phagocytic Activity During Unilateral Injuries of the Nervous System," by G. N. Prizhivoyt, Tr. Blagoveshchen. Med. In-ta (Works of the Blagoveshchensk Medical Institute), 1956, No 2, pp 215-221 (from Referativnyy Zhurnal -- Biologiya, No 1, 10 Jan 58, Abstract No 2964, pp 310-311)

"Tests were conducted on the blood of 19 patients suffering inflammatory injuries of the peripheral nervous system and 31 patients with unilateral injuries of the brain.

"Blood samples taken from the injured side of the patients of the first group revealed that while feeling pain, leukocyte count rose, and leukocyte phagocytic activity was intensified.

"Blood samples taken from the affected side of the second group of patients revealed that during the sickness, leukocyte count and leukocyte phagocytic activity were decreased as compared with results of the non-injured side.

"At later stages of the disease, blood samples taken from the affected side of the patients of the second group indicated that leukocyte count was increased, but the phagocytic activity was lower than that of the contralateral side."

61. Pronounced Insufficiency of Prothrombokinase of Blood Platelets in Radiation Injury Blamed for Hemorrhage

"On the Nature of Hemorrhage in Experimental Radiation Injury of Animals," by Prof B. A. Kudryashov, G. V. Adreyenko, P. D. Ulitina, G. G. Bazaz'yan, V. Ye. Pastorova, N. P. Sytina, T. M. Kalishevskaya, and Ye. Ye. Shimonayeva, Soil Biology Faculty of Moscow State University; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 2, No 6, Nov/Dec 57, pp 3-11

A review of literature on the hemorrhagic syndrome and the physiology and biochemistry of blood coagulation indicates that various authors attribute hemorrhage to various causes, for example, excessive amounts of heparin which inhibit coagulation, insufficient blood platelets due to radiation injury, hypoproteinemia leading to hemorrhage, etc. The present research on radiation hemorrhage is based on animal experimentation from 1950 to 1956 inclusive.

Tests were run on albino rats, irradiated with P^{32} or X-ray doses of 100, 150, 250, 400, 500, 600, 800, and 1,250-1,300 r. Various graphs represent changes in average time for blood coagulation, changes in the concentration of Ac-globulin, average time for the coagulation of oxalated plasma, changes in thromboplastic activity of blood, changes in the content of factor VII in blood serum, and changes of bleeding time in irradiated rats with regard to the level of thromboplastic activity of blood, etc. Some irradiation was without filters, and some was combined with screening of the upper lumbar region from irradiation.

The following scheme is cited for blood coagulation:

1. $$\frac{\text{Blood prothrombokinase}}{\text{factor 3 of platelets}} + \frac{\text{thrombotropin}}{\text{proconvertin, factor X}} \rightarrow$$

$$\frac{\text{Blood thrombokinase}}{\text{convertin, factor VII, SPCA}}$$

2. $$\frac{\text{Prothrombin} + \text{Ca} + \text{Thrombokinase}}{\text{Ac-Globulin}} \rightarrow \text{Thrombin}$$

3. $$\frac{\text{Fibrinogen} + \text{Thrombin}}{\text{Factor 2 from platelets}} \rightarrow \text{Fibrin}$$

The authors make the following conclusions:

"Hemorrhages in rats irradiated with X rays or P^{32} are due to pronounced insufficiency of prothrombokinase of blood platelets. Prothrombokinase insufficiency restricts the formation of convertin in the blood serum and leads to a decreased thromboplastic activity of the blood (down to 20 percent and lower). Hence, disturbance of the physiological stability of capillaries ensues (down to 30% of the normal values), thus provoking favorable conditions for hemorrhagic manifestations. Vitamin B_{12} coupled with folic acid produces a positive effect in maintaining the thromboplastic activity of the blood only under conditions of combining the above with screening of the upper lumbar region in X-ray irradiation of animals." -- English abstract

Immunology and Therapeutics

62. Vaccination with SBV NIIEG Dry Live Brucellosis Vaccine Evaluated

"Morphological Characteristics of the Vaccine Process in Brucellosis," by V. F. Solomina, Institute of Regional Pathology, Academy of Sciences Kazakh SSR; Moscow, Arkhiv Patologii, Vol 20 No 3, Mar 58, pp 30-35

This article reports pathomorphological investigation of immunized guinea pigs to determine the harmlessness and prophylactic value of the "SBV NIIEG" dry live brucellosis vaccine (the Dorofeyev and Chalisov vaccine, tested in Kazakhstan in 1947 by I. K. Karakulova and N. F. Zenkova). The author also attempted to determine whether the pathomorphological changes observed are an index of immunity. The experimental method is described in detail; an illustration depicts giant cells in the liver 30-60 days after vaccination, and a chart summarizes results of histological and bacteriological investigations. The following conclusions based on the results of these experiments are presented:

"1. Infection of guinea pigs with two infective doses of Brucella melitensis (20 microbial cells) produces generalized brucellosis infection with severe pathomorphological changes in the tissues of the internal organs, which are manifested by acute hyperplasia of reticuloendothelial elements and formation of brucellar granules and productive-destructive vasculitis with large necrotic foci.

"2. Inoculation of live dry brucellosis vaccine ('SBV NIIEG') causes pathomorphological changes of an inflammatory-proliferative nature in addition to seroallergic shifts in the organism.

"3. Immunological proliferation of reticuloendothelial elements increases during the first 2 months after vaccination and subsides 6-12 months after vaccination leaving no pathomorphological changes.

"4. Immunological proliferation of reticuloendothelial elements in tissues of internal organs are manifested to an equal extent following use of both the scratch and subcutaneous methods of vaccination.

"5. Live brucellosis vaccine ('SBV NIIEG') is effective inasmuch as it increases the resistance of animals to brucellosis infection. Defensive inflammatory-prophylactic reaction without the gross destructive changes characteristic of brucellosis are observed in vaccinated animals following their infection with brucellosis.

"Increase in resistance to brucellosis is observed when subcutaneous or scratch methods of vaccination are used."

A comparative study in guinea pigs has demonstrated that the "SVB NIIEG" vaccine is as effective as the Vershilova vaccine.

63. Tularemia Vaccination in Central Nervous System Disorders

"A Study of Immunological Reactivity of the Organism Following Vaccination of Persons With Changed Conditions of the Central Nervous System Against Tularemia," by L. S. Matveyets, N. G. Olsuf'yev, Yu. A. Il'yinskiy, N. M. Zharikov, and O. V. Kerbikov, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya and the Second Moscow Medical Institute; Moscow, Zhurnal Mikrobiologii, Epidemiologii, i Immunobiologii, Vol 28, No 9, Sep 57, pp 46-51

This article deals with the role of the central nervous system, particularly the cerebral cortex, in immunogenesis. To examine immunological reactivity in persons with central nervous system disorders, the authors selected patients with catatonic and other forms of schizophrenia and vaccinated them against tularemia. The experiments were conducted in a psychiatric hospital (Yu. B. Rozinskiy, chief physician) in an area threatened with tularemia. An observed decrease in the effectiveness of tularemia vaccination motivated the research described, in which vaccine series No 7, prepared at the Institute of Epidemiology and Microbiology imeni Gamaleya was used. Cutaneous vaccination was effected by the usual method. The agglutination reaction was performed with patients' blood and tularemia diagnosticum; negative results were obtained when the serum was diluted in proportions of 1:5 and higher. The tularin test was also consistently negative. A chart and a graph present the following information: skin inoculation reaction and immunological indexes in schizophrenia patients and healthy persons inoculated cutaneously with antitularemia vaccine; and dynamics of antibodies in persons inoculated against tularemia and having an altered condition of the central nervous system.

Conclusions drawn from analysis of the experimental results are as follows:

"1. In protracted schizophrenia with pronounced deficiency, indexes of immunological reactivity upon vaccination against tularemia were lower than in healthy persons.

"2. A connection between indexes of immunological reactivity and the clinical condition was noted in this group of patients: immunological reactivity was considerably lower in a catatonic stupor than in healthy persons; it was lower in catatonic excitation, but to a lesser extent; it did not differ from healthy reactivity in the paranoid syndrome and states of apathetic dementia.

"3. In schizophrenia with a favorable course and with no pronounced deficiency indexes of immunological reactivity did not differ from those observed in healthy persons.

"4. Immunological reactivity was not decreased in oligophrenia.

"5. In the Parkinsonism syndrome, immunological reactivity did not differ from that observed in healthy persons according to one index, and approximated indexes of catatonic stupor according to another index.

"6. Dysfunction of subcortical activity plays a large part in changes in the immunological reactivity of an organism."

64. Antigens for Polyvaccines

"The Two-Phase Method of Producing Antigens for Polyvaccines," by Ye. A. Moldavskaya, L. G. Sheftel', and A. K. Vargina, Nauchn. tr. Mosk. n.-i. in-ta vaktsin i syvorotok. (Scientific Works of the Moscow Scientific Research Institute of Vaccines and Sera), 1956, No 8, pp 340-343; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 23, 10 Dec 57, Abstract No 25441, by Ye. Moldovskaya)

"Antigens obtained from a culture medium on which microbes were grown by the deep method with aeration were investigated. The antigen was precipitated from the medium by 50% $(NH_4)_2SO_4$. The antigen yield amounted to 0.3-0.6 g/liter of centrifugate. The antigen from the liquid part of the culture contained more N than the antigen from the digested microbial mass; however, the immunogenic activity of this antigen, especially from 'Tu' microbes, greatly surpasses the antigen from the digested microbial mass."

65. Research Sheds New Light on Pathogenesis and Etiology of Some Diseases

"The Significance of Serological Methods for Determining Autoaggressive Diseases," by I. Valevskaya, Serological Laboratory (leader, Prof I. Lille-Szyszkowicz) of the Hematological Institute of Warsaw; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 2, No 6, Nov/Dec 57, pp 11-15

The existence of autoantibodies may be proved in many diseases, and parallel experiments by Lille-Szyszkowicz and Chojnacka indicate that the appearance of microspherocytes in the serum is closely connected with the presence of autoantibodies which block the receptors on the surface of erythrocytes.

The author discusses autoimmunization, change of antigenic structure of erythrocytes in infectious diseases, and autoantibodies blocking erythrocytes and causing agglutination and hemolysis.

A positive Coomb's reaction was used as an index for erythrocyte sensitization, in vivo, and studies on 55 patients with hemolytic anemia proved the presence of many antibodies, i.e., cold and warm auto- and iso-agglutinins, acid, and nonacid hemolysins, and antibodies giving Coomb's reaction. By using certain serological methods prevalent in modern immunohematological methods, it is possible to demonstrate in the serum of patients specific immune antibodies which agglutinate erythrocytes that are sensitized by extracts from thrombocytes.

A modification of the well-known method of Boyden with stained erythrocytes serving as an index is mentioned. Autoagglutinins may be directed exclusively against blood leukocytes, or exclusively against certain organs, and these antibodies may be determined either by the use of Boyden's method or antiglobulin methods.

The author concludes that a close study of this research sheds new light on the pathogenesis and etiology of many diseases.

66. Coomb's Antiglobulin Test Significant in Diagnosis of Congenital and Acquired Hemolytic Anemia

"Coomb's Antiglobulin Test and its Significance in the Diagnosis of Autoimmune Hemolytic Anemia," by Docent S. M. Martynov, Kh. V. Kuriy, Ya. I. Nikiforuk, and A. R. Rabinovich, Lvov Scientific Research Institute for Blood Transfusion (director, Docent D. G. Petrov); Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 2, No 6, Nov/Dec 57, pp 15-20

The aim of this research was to discover the best method for immunization of rabbits as a source of antiglobulin serum and to check the diagnostic significance of the antiglobulin method on groups of patients with various forms of hemolytic anemia and other diseases of the blood system.

Tests were run on 42 patients with congenital, and idiopathic hemolytic anemia, agranulocytosis, granulocytopenia, injuries of the lymphatic apparatus, and other blood diseases.

Each of the six patients with congenital hemolytic anemia had a negative Coomb's test, and eight of the nine patients with acquired hemolytic anemia had a positive antiglobulin test, thus enabling one to differentiate between these two types of hemolytic anemia. Seven positive tests were recorded for the remaining 27 cases. Positive antiglobulin tests in cases of agranulocytosis are explained as evidence "that erythrocyte autoantibodies take part in the affection of bone marrow granulpoiesis."

Matoth and his coworkers, basing their views on their own research, think that monosystemic injuries, for example agranulocytosis, are conditioned by one type of antibodies, while polysystemic injuries, i.e., pancytopenia, are conditioned by several types of antibodies strictly specific to different elements of the blood apparatus.

The authors propose that, while not at all repudiating the specificity of antibodies, the picture of immune pancytopenia and the accompanying injuries of several organs may be explained by the presence in the various cellular systems of similar groups of antibody structures, and these antibody structures react as one type of antibodies which are formed during the process of autoimmunization.

67. Sites for Direct and Indirect Antibody Formation Analyzed and Discussed

"Concerning the Site for Formation of Antibodies in an Organism" (review of literature), by V. A. Parnes, Division of Immunology and Malignant Tumors (head, Prof L. A. Zil'ber, Active Member of Academy of Medical Sciences USSR) of the Institute of Epidemiology and Microbiology imeni N. F. Gamaleya (director, Prof Muromtsev) of the Academy of Medical Sciences USSR; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 2, No 6, Nov/Dec 57, pp 20-30

This article reviews literature on the controversial theories concerning the site or sites for the formation of antibodies.

Ten facts supporting the theory that antibodies are produced by lymphatic tissue are cited. These include experimental work by McMaster, Ehrich, Dougherty, Bjorneboe, Murphy, Evans, Taliaferro, and Forshter, and their coworkers, and others.

The role of plasma cells in the production of antibodies is proved by the fact that patients with agamma-globulinema in whose bone marrow and lymph glands very few plasma cells are seen show decreased capacity of antibody production. Studies of myeloma diseases lead to the conclusion that plasma cells play a fundamental role in producing globulins and especially gamma globulins, and the fact that increase of plasma cells is accompanied by hyperglobulinemia with a sharp predominance of gamma globulins.

At present, the "genetic theory" has many weak spots which need experimental verification, but accumulating data make it possible to consider that the formation of antibodies is a complex process in which a number of cellular formation of antibodies is a complex process in which a number of cellular forms participate, such as macrophages, plasma cells, and lymphocytes. Some of these (macrophages) capture the corpuscular antigens and make them soluble, while others participate directly in the synthesis of antibodies. Various forms of leukemia involve different processes and different cellular elements. Some forms involve the phase of preparation of antigens, while other forms of leukemia involve the very synthesis of antibodies.

Internal Medicine

68. Third National Congress of Czechoslovak Endocrinologists Held

"Third National Congress of Czechoslovak Endocrinologist" (unsigned article); Prague, Rude Pravo, 20 Apr 58, p 5

The Third National Congress of Czechoslovak Endocrinologists, which was held in Brno, ended on 19 April. The meeting affirmed that endocrinological research and practice today is a general part of the work of all Czechoslovak physicians.

Parasitology

69. Tick Species Along the Orenburg Railway

"Ixodid Tick Species Along the Orenburg Railway," A. A. Ivanova, Sanitary Epidemiological Station of the Orenburg Railway; Moscow, Meditsinskaya Parazitologiya i Parazitarnyye Bolezni, No 2, Mar/Apr 58, p 221

During the past 2 years an effort was made to classify the ticks found along the Orenburg Railway, mainly near the cities of Orsk, Kuvandak, Orenburg, Uralsk, and Kazadinsk. The following species of the genus Ixodes were identified: Hyalomma scupense, H. plumbeum, Dermacentor marginatus, D. pictus, Rhipicephalus rossicus, Haemaphysalis punctata, H. concinna, and Ixodes persulcatus. In one instance, a member of the genus Argasid -- the Argas persicus -- was identified. As a result of the data collected, it was determined that the H. scupense and the D. marginatus were more prevelant than any of the other species.

70. Chinese Develop Method for Isolating Pure Schistosoma Eggs From Rabbit Liver

"Technique for Isolating Pure Ova From the Liver of Rabbits With Japanese Schistosomaisis," by Sun Man-chi (孙 曼 驰), Lin Hui (林 惠), and Chou T'ing-ch'ung (周 廷 冲), Department of Pharmacology, People's liberation Army Academy of Medical Sciences: Peiping, Chung-hua I-hsueh Tsa-chih (National Medical Journal of China), Vol 44, No 2, 1958, pp 147-149

This article describes in detail a method for isolating pure schistosoma eggs from the liver of rabbits experimentally infested with Schistosoma japonicum. The technique involves passing liver paste through a silk sieve with 0.0144-mm^2 mesh and separating the pure ova from the filtrate by centrifugation and elution. It was found that rabbits infested with 2,000-2,500 cercariae give the highest yield during the 45-55th days of infection. The method presented does not separate the mature ova from the immature, or the living from the dead.

Pharmacology and Toxicology

71. Problem of Necrosis Caused by Colamine

"The Problem Concerning Necrosis Appearing After the Administration of Colamine," by G. V. Kamalyan and G. V. Barsegyan, Tr. Yerevansk. zoovet. in-ta. (Works of the Yerevan Zooveterinary Institute), 1955, No 19, pp 103-106; (from Referativnyy Zhurnal--Khimiya, Biologicheskaya Khimiya, No 19, 10 Oct 57, Abstract No 21950, by D. Podgayetskaya)

"Subcutaneous and intramuscular administration of colamine produces necrosis. The necrotic action of the acid salt of colamine, especially the acetic acid salt, is smaller than the action of pure colamine. With intravenous and per os administration, necrosis was not observed."

72. Bactericidal Action of Fruit Juices

"The Bactericidal Action of Citrus Juices," by L. M. Petrzhikovskaya, Tr. Odessk. tekhnol. in-ta. pishch. i kholodil'n. prom-sti. (Works of the Odessa Technical Institute of the Food and Refrigeration Industry), 1956, No 7, pp 117-129; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 23, 10 Dec 57, Abstract No 26358, by Yu. O. Sazykin)

"Orange and grapefruit juice possess greater selective bactericidal action on microbes than lemon juice. Tangerine juice possess slight bactericidal action. The application of heat to orange juice weakens its action on Bac. subtilis and Bac. mesentericus while at the same time increasing its action on Bact. coli, Bact. muripestifer, and Bact. prodigiosum. The neutralization of lemon and orange juice greatly reduces their bactericidal action. The addition of citric glucosides -- naringin and hesperidene -- to tangerine juice contributes to the preservation of the viability of one particular microbe while accelerating the death of others; therefore, the action of these glucosides is conflicting."

73. Toxic Action of HN_3

"The Formation of Amides and Their Phosphorylation in the Brain Under Certain Conditions," by K. G. Konopel'ko, Tr. Kirg. gos. med. in-ta. (Works of the Kirgiz State Medical Institute), 1956, No 8, 195-199; (from Referativnyy Zhurnal -- Khimiya, Biologicheskaya Khimiya, No 23, 10 Dec 57, Abstract No 26594, by V. Gershanovich)

"In experiments on white mice, rats, and rabbits, the toxic action of NH_3 and the possibility of lowering it by 70-75% with the aid of Na glutamate was investigated. The quantity of free and amido nitrogen increased in the brain of rats during ammonia poisoning; analogous phenomena were attained by irritating the animals with bright light. In addition to increasing the quantity of free and amido N in the brain tissue, prolonged exposure of rats to darkness increased the quantity of total P since its content in organic compounds was reduced."

Physiology

74. Speech and Hearing in Rarified Atmosphere Studied

"Some Peculiarities of Auditory Acuity and Speech Under Greatly Rarefied Atmospheric Pressure,: by Candidate of Medical Sciences I. Ya. Barshevskiy; Moscow, Vestnik Otorinolaringologii, No 2, Mar/Apr 58, pp 9-14

"Results of investigations, conducted on the ground, of auditory acuity and word utterance in rarefied atmosphere corresponding to that existing at altitudes of 15,000 m revealed that the changes that take place in those functions of the human organism at such altitudes are slight and are easily reversible. They do not prevent verbal communication. The combined effect of high altitude and inspiration of oxygen under increased pressure greatly impairs hearing. Changes in auditory sensation take place in conformance with the general resistance to altitudes and are, therefore, quite individual. Some improvement in hearing, noted in some individuals, can be explained by the fact that pressure on the tympanic membrane via the external auditory canal is equal to the external pressure and, at the same time, the pressure on the middle ear is equal to the external pressure plus the increased pressure under the oxygen mask." The author also states that a gradual increase in pressure of inspired oxygen at gradually higher altitudes is both an effective and purposeful method of speech training.

75. Effect of Sound on Glycogen Distribution in Organ of Corti Investigated

"Presence and Distribution of Glycogen in the Organ of Corti While at Relative Rest and When Subjected to Sound Stimuli," by Ya. A. Vinnikov and L. K. Titova; Moscow, Doklady Akademii Nauk SSSR, Vol 116, No 5, 1957, pp 892-895

Results of histochemical examination of 60 organs of corti, consisting mostly of surface preparations and several sections, revealed that an unusually large quantity of glycogen was present in their cells. Furthermore, the nature and distribution of glycogen in the organ of corti was constantly changing depending on whether the animal was in a state of relative rest or under functional stress. Altogether 30 animals were used in the experiments, 20 of which were guinea pigs; 5, young rabbits; and the other 5, young tomcats.

The animals were divided into three control groups with ten animals in each group. The first group of animals was kept in a state of relative rest and the second group was subjected for one hour to sound stimuli of high frequency equal to 1,500 cycles, 95 decibels. The third group

was subjected for one hour to sound stimuli of low frequency of 300 cycles, 95 decibels. Sound stimulation of the organ of corti of the second and the third group of animals was continued even after decapitation of animals, in fact up to the time the data were recorded.

Distribution of glycogen in the organ of corti among animals of the first control group differed somewhat depending on the species to which each animal belonged. Glycogen in the guinea pigs was concentrated exclusively in the outer supporting cells along the entire stretch of the organ of corti and in all helices of the cochlea.

No granules of glycogen were noted in the inner supporting cells of the organ of corti of guinea pigs. Glycogen was also absent in the columnar and the inner and outer phalangeal cells, although some was observed in the upper helix of the cochlea in the area of helicotrema. A negligible amount of glycogen, in the form of fine granules, was found also in Hensen's cells and in Claudius' cells. Glycogen in a form of large granules was observed in a few epithelial cells in the epithelium of the vascular band.

Fine granules were always present in the epithelium of the inner lining of Reissner's membrane. Such granules were absent in the connecting tissues and in the endothelium of Reissner's membrane.

In contrast to what was observed in the guinea pigs, individual granules of glycogen were found in the inner supporting cells of rabbits. As far as the outer supporting cells are concerned, the content and distribution of granules of glycogen in rabbits did not differ from that found in guinea pigs. The number of granules of glycogen increased sharply in the Deiters' cells of rabbits. This was noted particularly in the Hensen cells and in the Claudius cells. Large granules of glycogen were found in the epithelial cells of the vascular surface.

In young tomcats, like in guinea pigs, glycogen was absent in the inner supporting cells. However, a few granules were noted in the outer supporting cells, particularly in those occupying the inside row. On the other hand, a very large quantity of glycogen granules were observed in the Deiters cells and especially in the Hensen and Claudius cells. A very large accumulation of glycogen, in the form of huge granules, was observed in the epithelial cells of the vascular surface. The picture was found to be otherwise the same as that observed in guinea pigs and rabbits.

Results of experiments with the second group of animals showed that application of high-frequency sounds (1,500 cycles, 95 decibels) produced a sharp fluctuation in the content and nature of distribution of glycogen in the organ of corti. Application of the above-mentioned frequency sounds produced a number of characteristic changes in the outer supporting cells that are located in the last and partially in the middle helices.

The cells contracted in response to sound stimulation and change their shape turning into round bodies. In permeating the cytoplasm of the stimulated supporting cells, glycogen lost its granular shape and became diffused in character. It filled up the entire body of each cell except the nucleus. Concentration of diffused glycogen within each cellular body was varied. It grew in magnitude gradually, depending on how close it got to the basal pole of the cell and sharply increased there. Thus it was possible to note the presence of an apico-basal gradient in the distribution and concentration of glycogen in outer supporting cells subjected to sound stimuli. It must be pointed out that there were a considerable number of supporting cells in which glycogen was absent altogether, even in a diffused form; apparently it spent itself.

Traces of diffused glycogen were observed in the Hensen, Deiters, and Claudius cells. These traces were more concentrated in the epithelium of the vascular surface and occasionally took the form of granules.

Similar changes were observed in the organ of corti of rabbits and young tomcats when they were subjected for an hour to the same high-frequency sound as above. It must be noted, however, that the general concentration of glycogen in the supporting cells of rabbits and young tomcats was considerably lower than that observed in guinea pigs. In young tomcats, glycogen often was absent in the outer supporting cells. On the other hand, concentration of diffused glycogen increased in the Deiters, Hensens, and Claudius cells and in the epithelium of the vascular surface of young tomcats and rabbits. Furthermore, glycogen accumulated in those sections of the above-mentioned elements which oppose the supporting cells. Such a polarization of glycogen in the auxiliary cells of the organ of corti attests to its synthesis and transposition in the direction of the supporting cells, its chief consumers. There is no doubt that the supporting cells possess the ability to synthesize glycogen.

Similar changes in the nature of the distribution of glycogen were observed in the third control group of animals subjected to sound stimuli of low frequency (300 cycles, 95 decibels). But in contrast to the second control group, the described changes in the supporting cells were observed only in the region of the upper helix and partially in the middle helix. The supporting cells of the lower helix did not change and retained the granular glycogen in their cytoplasm. The only difference was observed in guinea pigs; here the diffused glycogen practically disappeared in the outer supporting cells of the upper helix in the region of helicotrema. It accumulated, however, in the adjoining Deiters cells. A concentration gradient was distinctly evident in the Deiters cells. A sharp increase was noted in the apical area proximal to the base of the support cells.

Results of the experiments thus revealed that sufficiently distinct changes occur in the distribution and nature of glycogen in the outer supporting cells of the organ of corti while it is at relative rest and when subjected to sound stimuli. Stimulation of supporting cells on the one hand is associated with the frequency of sound waves and on the other hand with their location on both levels of the cochlear helix. Expenditure of glycogen is directly related to the frequency and evidently takes place by means of glycogenolysis and resynthesis in the endogenous substratum of the supporting cells of the organ of corti. There is no basis for doubting that glycogen goes through similar changes and plays the same role in the organ of corti as it is known to play in the liver, muscles, nervous system, and retina.

Two illustrations are offered. Illustration No 1 shows a total surface preparation of the organ of corti in the region of third cochlear helix of a guinea pig while at relative rest. Glycogen in the form of granules saturates the body of the outer supporting cells. Illustration No 2 shows a total surface preparation of the organ of corti in the region of the third cochlear helix of a guinea pig following exposure for one hour to sound stimuli of higher frequency equal to 1,500 cycles, 95 decibels and diffused glycogen in the contracted supporting cells.

76. Effect of Powerful Sound on Vital Staining of Cerebral Cortex

"Changes in the Vital Staining of the Cerebral Cortex of Mice When Acted Upon by Powerful Sounds," by A. V. Zhirmunskiy (presented by Academician Ye. N. Pavlovskiy, 8 Oct 56); Moscow, Doklady Akademii Nauk USSR, Vol 112, No 3, 21 Jan 57, pp 553-555

Since little has been done to date to ascertain what changes take place in the cerebral cortex of living animals when acted upon by a powerful sound, the author decided to launch a series of experiments with mice. A comparison was first made of the sorption of neutral red by the cerebral cortex of mice subjected to the action of a constant sound of 2,500 cycles and a control group of mice. A series of 20 experiments was made. No substantial difference appeared in the cerebral cortex of mice of either group. In another series of 12 experiments, mice were subjected to an intermittent sound of 2,500 cycles. Results of this series of experiments showed that the intermittent sound actually produced significant changes in the cerebral cortex. Examination of the stained layers of the cortex of these mice showed increased sorption of neutral red by the cortex Other observations, made in conjunction with A. M. Ivanova, showed that while mice sat quietly in their cage and often dozed off in response to prolonged action of a powerful constant sound, they showed considerable motor activity (stood on hind legs, ran around in the cage, etc.) when exposed to an intermittent sound. It was noted that changes were discovered

in the parietal lobe of the cortex although the generally accepted view has been that the auditory centers are localized in the temporal lobe. This may be explained by the fact that irritation of sound analysor results in a diffusion of excitation over the entire cortex and particularly in excitation of the motor centers. The observed increased motor activity of the mice during the action of an intermittent sound may serve as confirmation of this. The fact that no changes were observed during the action of constant sound, when no motor activity could be noted in the mice, also seems to support this view. Thus, in the author's opinion, an increase in the sorption of neutral red can be observed in the parietal lobe of the cerebral cortex during the prolonged action of an intermittent sound on white mice, which can be explained as a manifestation of excitation of the cortical cells.

77. Chinese Study Effect of Hypotension on Chemoreceptor Reflexes

"Influence of Experimental Hypotension on Some Chemoreceptor Reflexes," by Shen Chi-ch'un (沈 霽 春), Sung Hsiao-lu (宋 小 魯), and Li Shih-yuan (李 士 婉), Shanghai; Peiping, Sheng-li Hsueh-pao (Acta Physiologica Sinica), Vol 22, No 1, 1958, pp 83-89

This paper, published with an English abstract, reports the details of experiments performed on 28 dogs and 14 cats to observe the effects of experimental hypotension on some chemoreceptor reflexes. It was found that in cases of hypotension induced by acute hemorrhage, by histamine infusion, by injection of foreign serum, and by local application of adrenalin to the carotid sinuses, the chemoreceptor reflexes were either reduced in magnitude or completely inhibited. In many cases the chemoreceptor reflexes were retained even though the carotid-sinus reflexes were abolished, indicating that the former are more tolerant to arterial hypotension and have some real significance in the survival of the organism. With respect to this, the authors add that, according to unpublished experimental data obtained in their laboratory, normal respiration has been restored by chemical stimulation of carotid bodies of experimental dogs which had stopped breathing during deep anesthesia.

In the present experiments, it was also found that chemoreceptor reflexes reacted to experimental hypotension in varying degrees-- respiratory responses being generally less affected than blood pressure responses.

The authors conclude that the decrease or disappearance of chemoreceptor reflexes during experimental hypotension may be due to central inhibition, to extensive peripheral vasodilation, or to great reduction in circulatory blood volume.

For the preparation of the nonspecific hog serum used in these experiments, the authors express thanks to Hua Fu-i (华 復 一) et al, of the Department of Biochemistry, of the "same institute" (本 院) as theirs.

Public Health, Hygiene, and Sanitation

78. Biological Warfare Defense Instruction

"How to Defend Yourself Against a Bacteriological Weapon," by G. Labezov, Lt Col Med Serv; Moscow, Kryl'ya Rodiny, No 12, Dec 57, pp 27-28

"In What Way is a Bacteriological Weapon Dangerous?

"Both pathogenic microorganisms and poisons (toxins) elaborated by certain microorganisms, which are used intentionally for the infection of humans, animals, plants, or food supplies, are considered a bacteriological weapon. The concept of a 'biological weapon' is still broader. It includes not only pathogenic microorganisms and toxins, but also the carriers of infectious diseases (insects, ticks, and mites, and agricultural crop pests, which can be used to infect humans, or destroy agricultural plants, animals and food supplies).

"The bacteriological weapon is a powerful and dangerous weapon. In the first place, pathogenic microorganisms are frequently very difficult to detect and this increases the danger of dispersal of those infected with the diseases and complicates the task of liquidating the effects of the enemy's attack. Second, the entrance of even an infinitesimal dose of the pathogenic microorganisms into the human organism may cause death. Third, between the moment of infection and the appearance of the first signs of the disease a certain time elapses (the incubation period). Finally, the bacteriological weapon has a stable and prolonged action.

"The bacteriological weapon can be delivered in an aerial bomb, air-mine, artillery shell, special containers, sacks, boxes, and packages, or disseminated from an airplane. Infected insects can be scattered from an airplane by means of special apparatus. Saboteurs can contaminate water supplies, the air in public buildings, food supplies, fodder, small areas, and various objects. An enemy bacteriological attack can occur at any time of the day or night, in any season of the year, and in any weather.

"An infectious disease arises only when the pathogenic microorganisms or toxins penetrate into the organism. Most frequently, the microorganisms or toxins enter the organism through the nose, mouth, eyes or skin.

"During a bacteriological attack, infection can occur through breathing in contaminated air, consuming contaminated food or water, the bites of infected insects, ticks, or mites, or contact with infected objects or animals. Infection may also occur through associating with sick people, direct contamination of the skin or mucous membranes, or by being wounded by shell or mine fragments which have been contaminated with pathogenic microorganisms or toxins.

"What is the Basis of Defense Against a Bacteriological Weapon?

"The possibility of the enemy's using a bacteriological weapon makes it necessary to carry out a number of measures to counter his attack and to organize an antibacteriological defense.

"Antibacteriological defense calls for performing reconnaissance, destroying the agents with which the enemy has attacked, and carrying out a number of measures to prevent the contaminating action of the bacteriological weapon. We have effective means of defense, including prophylactic inoculations, individual and collective antichemical defense equipment, washing-disinfection equipment, and therapeutic and prophylactic medicinal preparations. They are ready to protect both the troops and the civilian populace from the contaminating action of a bacteriological weapon.

"However, the existing equipment and means for antibacteriological defense will only be effective if they are used skillfully.

"Normal hygienic requirements are the basis for the majority of measures for preventing infection. These requirements have been worked out as the result of many years of experience in the control of infectious diseases, are scientifically well grounded, and will be of paramount importance in a bacteriological war. Sanitary-hygiene measures cannot serve as a substitute for antibacteriological defense measures. They furnish a basis for the successful employment of the latter.

"It is necessary to prevent the entrance of the microorganisms through the mouth. Water from chance water sources should not be drunk; it is best to drink boiled water or hot tea. However, even boiled water can be dangerous to use after prolonged storage under unfavorable conditions without further decontamination. In the absence of boiled water, fresh decontaminated water from wells designated by the authorities can be used.

"The hands must be kept clean constantly, washing them without fail before eating. Before eating, dishes and eating utensils should also be carefully washed with boiled or very hot water. Special care should be taken with food products which do not undergo heat processing and are dispensed in nonhermetic packages (bread, sugar, salt, fresh fruit, vegetables, etc.).

"Everything which is to be used as food must be checked and controlled. Contamination can occur completely imperceptibly, even from produce or objects which appear completely clean to the naked eye. It is also important to refrain from harmful habits such as putting grass in one's mouth and chewing on a pencil or one's fingernails. One should not finish smoking anyone else's cigarette. Cigarettes should be rolled with clean hands. Under bacteriological warfare conditions, self-rolled cigarettes should not be glued together with saliva from one's tongue. The end of a cigar, cigarette, or the mouthpiece of a pipe should be decontaminated before being put in the mouth by holding it over the flame of a match.

"Everyone should keep his entire body clean by taking regular baths. Scratches and cuts should be covered with adhesive tape dressings, and wounds should be bandaged. Even minor skin injuries may facilitate the penetration of microorganisms or toxins into the organism. The eyes should not be rubbed, especially with dirty hands.

"When rodent carcasses or places where there are large accumulations of insects, ticks, or mites are observed, the authorities should be notified immediately. It is recommended that accumulations of ticks, mites, and insects be left undisturbed and not be approached. If a person is subjected to a mass attack by insects, ticks, or mites, he should leave the contaminated area rapidly and shake himself off. Then, he must report what has happened to the local authorities. Before examination by a feldsher or physician it is not recommended that he come close to anyone so that he will not transfer any insects, ticks, or mites which may remain on his clothes.

"Cleanliness and order should be maintained everywhere at all times, and buildings, engineering structures, and territories should be kept clean.

"It is important that one harden and train his body. A healthy body is more resistant to diseases.

"A high level of sanitary knowledge is the basis of successful defense against a bacteriological weapon.

"How to Act During an Enemy Bacteriological Attack

"When the gas alarm signal is sounded (which is also the signal for a bacteriological attack), the gas mask, and in special instances if they are available, a protective cape, gloves, and boots should be put on.

CPYRGHT

"Individual antichemical defense equipment can also be used in taking over contaminated areas. If standard defensive equipment is not available, make-shift material (towels, handkerchiefs, gauze bandage, or cotton) can be used. If it is not absolutely necessary, do not lie on contaminated ground. In extreme cases, it is wise to spread your clothes out under you.

"As soon as circumstances permit, partial sanitary processing and disinfection should be carried out.

"In a contaminated territory, wells, even those from which water was taken for drinking and food preparation prior to the enemy bacteriological attack, should not be used without the permission of a physician. Water in vessels, if they were not uncovered at the time of the bacteriological attack and have not been opened since, may be suitable for use. However, it is recommended that water from such vessels be used for drinking purposes only after partial sanitary processing and disinfection of its rims with the liquid from the individual packet, and decontamination of water with pantocide.

"If supplies are difficult to obtain and individual reserves of food products well wrapped in celophane or thick paper are available, they can be released for consumption. They should only be utilized, however, observing all the precautionary measures prescribed by a physician.

"Decontamination of individual dishes and eating utensils is accomplished by boiling them for at least an hour.

"In order that medical care may be initiated as rapidly as possible and to prevent the spread of disease, it is important that persons suffering from infectious diseases be discovered as soon as possible. The appearance of the first disease symptoms (elevation of temperature, vomiting, diarrhea, etc.) should be reported to the medical workers immediately. They have many effective therapeutic agents at their disposal to combat diseases -- it is only necessary to report oneself for treatment without delay. It should be remembered that it is difficult to cure a disease which has been neglected. Moreover, delayed discovery of persons suffering from infectious diseases will facilitate the spread of the disease.

"Isolation and confinement (quarantine) measures are of tremendous significance in preventing the spread of epidemics. Quarantined persons are forbidden to leave [their place of confinement] without permission. They must adhere strictly to their physician's instructions.

"Medicines prescribed for the prevention of disease must be taken immediately and inoculations should not be refused. Inoculations greatly increase the resistance of the body and, if a disease is contracted, lessen its severity."

Four illustrations show the following:

Top page 27: "Ceramic aerial bombs, shells, and containers."

Bottom page 27: "The use of a bacteriological weapon from an airplane in the form of fine liquid drops (aerosols)."

Top page 28: "Instructor-Methodologist M. Ya. Demet'yeva instructs students of the Moscow Petroleum Institute imeni Academician I. M. Gubkin on the theme 'Means of Defense Against Bacteriological Weapons.'"

Bottom page 28: "Disinfection of a building with the truck-mounted DUK apparatus."

79. Ultraviolet Lamps Used to Decontaminate Air in Laboratories

"Decontamination of the Air in Laboratory Installations With the Aid of Ultraviolet Radiation," by V. V. Vlodavets and N. B. Gushchina (Moscow), Institute of General and Communal Hygiene, Academy of Medical Sciences USSR; Kiev, Vrachebnoye Delo, No 4, Apr 57, pp 399-402

The article discusses experiments designed to determine the efficacy of using ultraviolet lamps to decontaminate and sterilize the air in bacteriological, virological, and histological laboratories where "there may be significant numbers of viable microorganisms (i.e., bacteria, mold fungi, actinomycetes, or yeast) which can have an effect on the quality of research work; contaminate pure cultures, inoculums, or tissue cultures; or disrupt a number of technological processes. In addition," the article continues, "the air in some laboratories may contain pathogenic microorganisms. This occurs chiefly when experiments on the infection of animals are carried out and during careless work with pathogenic cultures, for example, when liquids are blown out of pipettes."

The experiments were based on the method of S. S. Rechmenskiy who demonstrated experimentally that "microorganisms in the dust phase of a bacterial aerosol were considerably more resistant to the action of ultraviolet rays than they were in the droplet phase."

On the basis of the experimental results, recommendations are made for the construction and operation of ultraviolet installations so that maximum effect and safety are maintained.

80. Effect of Hexachlorane Smoke on Certain Ixodes

"The Effect of Hexachlorane Smoke on Certain Species of Ixodid Ticks," by T. P. Povalishina, L. I. Zhukova and N. N. Gorchakovskaya, Institute for the Study of Poliomyelitis, Academy of Medical Sciences USSR; Moscow, Meditsinskaya Parazitologiya i Parazitarnyye Bolezni, No 2, Mar/Apr 58, p 220

In a special chamber, the action of hexachlorane smoke, obtained by sublimating technical hexachlorane, was investigated on certain species of ixodid ticks. As a result of the experiments, it was determined that the smoke had a lethal effect on all the ticks used in the tests; however, the sensitivity displayed by various species was different. A 20-minute exposure to 0.05-0.064 g/m^2 was fatal for Ixodes persulcatus. Approximately 0.08-0.16 g/m^2 was fatal for Rhipicephalus turanicus and Hyalomma plumbeum. The most resistant to the smoke was Dermacentor marginatus; 0.128 g/m^2 was only fatal to one third of the ticks exposed.

81. Insecticidal Smoke in the Control of Blood-Sucking Diptera and Ticks

"Experiments in Utilizing Insecticidal Smoke in the Control of Blood-Sucking Diptera and Ticks in Khabarovskiy Kray," by A. V. Maslov, Chair of Biology and Parasitology, Khabarovsk State Medical Institute; Moscow, Meditsinskaya Parazitologiya i Parazitarnyye Bolezni, No 2, Mar/Apr 58, p 221

During 1956 in Khabarovskiy Kray, NBK-G17 smoke pots were used to treat 33 areas against blood-sucking diptera and ticks. Six of the areas involved 100-150 hectares, while 27 involved areas ranging in size from 5-10 to 25-50 hectares. Biotests conducted in the treated areas disclosed that a mixture of DDT and hexachlorane (0.2 to 0.5 kg/hectare) proved most effective. This mixture is fatal to mosquitoes up to 500 m from the smoke pot for 12 hours, and up to 1,000 m for 24 hours [sic]. NBK-G17 smoke pots using 0.5, 1.0 and 2 kg of hexachlorane per hectare proved fatal to Ixodes persulcatus over areas varying between 10 and 50 hectares. As prophylaxis against tick-borne encephalitis, 2-3 kg per hectare is considered effective.

82. Individual Protective Clothing Against Radioactive Contamination Described

"Protective Clothing Against Radioactive Contamination of Air," by Ye. Osipov; Moscow, Meditsinskiy Rabotnik, No 33, 25 Apr 58, p 4

Since the national economy of the Soviet Union makes extensive use of radioactive isotopes in biology and medicine, people working at installations using radioactive isotopes may become contaminated. Therefore, the problem of designing protective clothing is of great significance.

A scientific research institute (not identified) has developed a new-type protective pneumocostume (photograph included) prepared from special masticated rubber, joined to a soft helmet with a transparent plexiglass portion over the face. All the parts are joined into one unit and hermetically sealed by high-quality welding. A person dons it through a special slit, the borders of which are hermetically fastened by plastic clamps.

Pure air is admitted at the rate of 160-200 liters per minute into the pneumocostume, and this ensures normal respiration and ventilation and a protective air "cushion." Contamination by radioactive dust from external air is not serious in case of small cuts, because air resistance from inside the pneumocostume prevents the entrance of outside air. Another advantage of the masticated rubber polymer is the fact that radioactive contamination can be easily washed off.

For work not connected with great contamination of air by radioactive substances (therapeutic study, research in radiobiology, radiochemical laboratories, etc.), individual protective clothing of another type is designed. It consists of overalls and a little cap made of white moleskin, an apron and sleeves made of masticated rubber, and gloves made of special rubber. In case of dangerous contamination of the floor, peasant-type boots are worn.

To prevent the entrance of radioactive substances into the organs of respiration, this scientific research institute has constructed a valveless respirator, "Lepestok," which weighs no more than 10 grams and is designed for use once (photograph included). On the outside the respirator resembles a bandage made of gauze and cotton wool, but it is plastic; and on pressure from the fingers, it fits over the face, and since it is electrically charged, it "adheres" to the face. The Lepestok is 99.9% aerosol proof; it does not hamper respiration, is simple to manipulate and comfortable to use, and it is cheap. It may also be used in microbiological institutions and in clinics for infectious diseases.

Experimental work with radioactive substances indicates that correct organization of prophylaxis, and the skillful use of individual protective clothing can guard people against occupational diseases. Polymer materials suggested by this institute have been successfully used to cover the floors and walls of radiobiological laboratories.

Samples of Soviet individual means of protection against radioactive contamination have been successfully demonstrated at the Geneva Conference on Peaceful Purposes of Atomic Energy, and at exhibits in Sweden, Italy, Japan, Finland, India, Egypt, Yugoslavia, China, Czechoslovakia, and Poland. In the People's Democracies, these articles have found extensive practical usage.

Scientists of this institute have received numerous letters from the US, England, Italy, and other countries requesting information on the design of individual means of protection and their mode of operation.

The author concludes by saying that at present, work at this institute continues for obtaining new formulas of plastic materials, and for designing pneumocostumes without any hose.

Radiology

93. Influence of Vitamin A on Radiation Tolerance

"The Influence of Vitamin A On the Radiation Tolerance of Mice Irradiated With LD_{100}," by H. Langhof and W. Schwenke, Dermatology Clinic, University of Greifswald; Berlin, Das Deutsche Gesundheitswesen, Vol 12, No 26, 27 Jun 57, pp 803-807

Prophylactic administrations of vitamin A delayed the death of white mice which had been irradiated with LD_{100} (700 r) of X rays. There were marked differences in the manner in which animals of the same inbred species died or survived when the experiments were carried out in summer and then again in winter. This varying sensitivity to X rays is based on constitutional factors which vary with the seasons.

In the opinion of the authors, vitamin A represents an effective physiological agent in the prophylaxis of radiation effects. It is possible that its favorable effect can be increased by combining it not only with vitamin E, but also with the vitamin B complex (especially vitamin B_{12}) and with administrations of nucleoproteid and rutin [Heuwieser, H., Dtsch. med. Wschr., No 81, 1956, p 1461]. Since vitamin A delayed the death of animals exposed to LD_{100} (700 r), the authors believe it can contribute to the prophylaxis of the acute radiation syndrome. Axerophthol

also seems to be especially suitable for the prevention of damage which occurs as the result of the chronic effect of small radiation dosages. The authors do not believe, however, that it can prevent the mutative effect of ionizing radiation.

84. Skin Reactivity of an Organism Subordinate to Central Nervous System

"Concerning the Dependence of the Reactivity of Man's Skin on the Central Nervous System," by N. Z. Slinchenko, in the collection Sovrem. Vopr. Dermatol. (Modern Problems of Dermatology), Kiev, Gosmedizdat UkSSR, 1957, pp 28-31 (from Referativnyy Zhurnal -- Biologiya, No 2, 25 Jan 58, Abstract No 9148, p 470)

"Local 5-day irradiation by ultraviolet rays of the forearm of 29 people with dermatosis and syphilis led to an increased "Kavetskiy" index, not only on the irradiated, but also on the nonirradiated parts of the skin. The reactivity of an organism, one of the indexes of which is the "Kavetskiy" index, is subordinate to the central nervous system."

85. Ionizing Radiation Depresses Infectious and Postinfectious Immunity

"Concerning the Influence of Radiation Sickness on Immunity," by V. L. Troitskiy and M. A. Tumanyan, Tr. 1-y Zakavkazsk. Konferentsii po Med. Radiol. (Works of the First Transcaucasian Conference on Medical Radiology), Tbilisi, Gruzmedgiz, 1956, pp 75-84 (from Referativnyy Zhurnal -- Biologiya No 1, 10 Jan 58, Abstract No 2954, p 309)

"A single powerful radiation dose depresses both infectious and postinfectious immunity. No direct relationship was evident between the titer of antibody and general reactivity of an animal. Titers for antibody formation and immunogenesis are not identical with respect to radiosensitivity."

Miscellaneous

86. USSR Prospective Plan of Medical Research for 1959-1965

"The Prospective Development of Medical Science," by V. Timakov, Vice-President of Academy of Medical Sciences USSR; Moscow, Meditsinskiy Rabotnik, No 33, 25 Apr 58, p 3

Participants of the 12th Session of the General Assembly, Academy of Medical Sciences USSR, heard a report by Prof I. V. Davydovskiy, Active Member of the Academy of Medical Sciences USSR, on the prospective plan for the development of medical sciences in the USSR for 1959-1965. This plan describes the research which is to be conducted on 46 medical problems, among which are the following: physiology and pathology of higher nervous activity; problems of experimental biology; heredity in man; structure and function of proteins; mechanism of the action of therapeutic substances; investigation of new therapeutic-prophylactic agents including antibiotics; research on the variability of microorganisms; and study of immunity and certain infectious diseases. Special attention will be given to the work on problems of tuberculosis, cancer, cardiovascular diseases, rheumatism, and children's diseases.

In the former prospective plans, the Academy of Medical Sciences USSR planned research for only 24 medical problems, in which 27 scientific research institutes of the academy participated. In the present prospective plan, however, 42 principal institutes are to participate in carrying out the 46 projected medical research problems.

By order of the Ministry of Health USSR, the presidium of the Academy of Medical Sciences USSR is to be charged with supervising the fulfillment of the annual plans on scientific research of the more important problems in medical science in the USSR. The presidium is also charged with coordinating the scientific research conducted by institutes of the academy as well as by other scientific research institutes and vuzes (higher educational institutions) of the USSR and union republics.

The author points out that more attention will be given in the current prospective plan to the solution of medical problems affecting man directly and that greater coordination will be expected among scientific workers and institutions engaged in the solutions of the medical problems. To accomplish this coordination during the period 1959-1965, the principal institutes involved in the research, the problem commissions, and the departments of the academy are required to maintain close liaison with one another.

To further this coordination, new institutes and laboratories are to be organized, new periodicals issued, and the training of cadres improved. In addition, the institutes must be equipped with the newest equipment.

The author states that the role of the presidium of the Academy of Medical Sciences USSR is to present a problem to the collective of the institute responsible for the fulfillment of particular medical problems, and to present it to the individual scientists who will be in charge of the problem within the institute. The presidium is, therefore, required to organize the work schedule and to review progress as the work develops and at its completion.

In the rest of the article, the author discusses various aspects of children's diseases, gerentology, endemic hepatitis, and other diseases which will be investigated during the next 7 years.

87. All-Russian Congress of Surgeons To Be Held in December 1958

"All-Russian Congress of Surgeons" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 38, 13 May 58, p 4

The All-Russian Congress of Surgeons will be held in Leningrad from 15 to 20 December 1958. The program will include topics on peritonitis and its treatment, the suturing of head wounds and problems of traumatology, new developments in surgery, problems of anesthesiology and children's surgery, and organizational problems.

"Surgeons desiring to present papers on any of the above topics should communicate with the organizational committee of the congress at the following address: Moscow, B. Serpukhovskaya, 27, Institute of Surgery imeni A. V. Vishnevskiy, Academy of Medical Sciences USSR."

88. Visiting Sessions of Academy of Medical Sciences USSR

"Visiting Sessions of Academy of Medical Sciences USSR" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 37, 9 May 58, p 4

From 12 to 15 May 1958, a visiting session of the Academy of Medical Sciences USSR and the Ministry of Health RSFSR will be held in Astrakhan. The session was called by the Executive Committee of the Astrakhanskaya Oblast Soviet of Workers' Deputies and the Astrakhanskaya Oblast medical personnel. Some 50 reports were slated to be given concerning enteric infections, sanitary conditions of cities along the Volga, and problems of public health in general.

From 20 to 24 May 1958, a visiting session of the Academy of Medical Sciences USSR and the Ministry of Health Azerbaydzhan SSR will be held in Baku. The session's work will be concerned with problems of labor hygiene and prophylaxis of occupational diseases, and the establishment of hygenic norms and sanitary rules at petroleum establishments.

89. Head of Soviet Laboratory of Aeroionization Visits Bucharest

"Visiting Rumanian Friends" (unsigned article); Moscow, Meditsinskiy Rabotnik, No 34, 29 Apr 58, p 4

F. G. Portnov, head of the Scientific Research Laboratory of Aeroionization (Nauchno-Issledovatel'skaya Laboratoriya Aeroionizatsii) in Riga visited Bucharest in February 1958. Portnov was invited by the Ministry of Health of Rumania and spoke with various groups on the therapeutic utilization of aeroions. Portnov also spoke to a large audience on "The Aeroionotherapy of Cerebral Forms of Hypertonic Diseases." In addition, Portnov participated in the experimental testing of an instrument invented by the Rumanian engineer Eygeles which is described as a hydroaeroionizator used for aerosol therapy.

90. Outline of Future Work on Heat-Resistant Alloys and Semiconductor Materials

"Resolution of the Conference on the Investigation of Constitutional Diagrams of Metal Systems Held at the Institute of Metallurgy, Academy of Sciences USSR, on 17-21 May 1957" (unsigned article); Moscow, Zhurnal Meorganicheskoy Khimii, Vol 3, No 4, Apr 58, pp 949-950

"This conference was the first all-union meeting held on the subject of constitutional diagrams.

"The purpose of the conference was generalization of the extensive theoretical and experimental material on constitutional diagrams of metal systems that had accumulated as a result of work done in the USSR and abroad. Some of the objects of the conference were also discussion of this material and its popularization. The importance of the investigation of constitutional diagrams has considerably increased in recent years because of the very rapid development of new fields of technology and the necessity to develop in connection with this new alloys which have special mechanical and physical properties, viz., heat-resistant, semiconductor, chemically resistant, magnetic, and other alloys.

"Reports on the following subjects were heard at the conference:

"1. Achievements and prospects in the field of the investigation of constitutional diagrams of metal systems, dependence of the type of constitutional diagram on the structure of the electron shell and the position occupied by the components of the alloy in the periodic system of elements; themodynamic calculation of constitutional diagrams involving bicomponent and tricomponent phase equilibriums; methods of representing multicomponent constitutional diagrams, general problems pertaining to the theory of equilibrium diagrams of multicomponent metal alloys, etc.

"2. Development and application of new methods of investigation, including X-ray determination of the boundaries of solubility of large crystalline samples by the oscillation method, microthermic and microdilatometric analysis, the method of the absolute thermoelectromotive force, the method of intermetallic phase analysis for the determination of the composition of individual phases, the method of settling and drawing off of the liquid phase, the drop method of measuring temperatures, etc.

"3. Principal attention at the conference was paid to the discussion of experimental data on constitutional diagrams of the following systems:

"a. Systems based on aluminum and magnesium.

"b. Those based on titanium.

"c. Those based on heat-resistant metals (chromium, molybdenum, tungsten, and niobium).

"d. Systems based on metals of the eighth group of the periodic system.

"e. Those based on rare and noble metals (rhenium and palladium).

"f. Those based on chemical compounds (borides, carbides, and silicides).

"4. The conference notes with satisfaction progress of work on the investigation of constitutional diagrams at the Academies of Sciences Ukrainian SSR and Georgian SSR and at the chairs of higher educational institutions, including Moscow State University, Khar'kov State University, and L'vov State University, as well as at the Steel Institute and the Institute of General and Inorganic Chemistry imeni S. S. Kurnakov, Academy of Sciences USSR.

"Notwithstanding the definite achievements in the field of theoretical and experimental research on constitutional diagrams which have been made, the following shortcomings must be noted:

"1. During recent years there has been a noticeable lag in the development of this field of knowledge from the standpoint of practical demands made in connection with the development of new branches of technology. Ternary and multicomponent systems are not being investigated adequately, and insufficient work is being done on the constitutional diagrams of systems based on high-melting metals, rare metals, and semiconductor materials. The effect of high pressures on constitutional diagrams is not being investigated adequately. Insufficient work is being done on composition-property diagrams.

"2. Theoretical work on constitutional diagrams of metal systems is not being done on an extensive enough scale; this includes work on the development and application of thermodynamic methods for the calculation of constitutional diagrams.

"3. Because of inferior coordination and insufficient consideration given to data obtained by USSR investigators and foreign workers, there is unnecessary duplication and repetition of research.

"4. The method of differential thermal analysis at 1,500-2,500° has not been developed sufficiently and is not being applied. X-ray methods, including high-temperature X-ray analysis, are not being applied to a sufficient extent in the investigation of constitutional diagrams. The same applies to electron microscopy.

"5. Because of the absence of a periodical which specializes in the field of constitutional diagrams, the exchange of experience and the popularization of original research in this field are hampered.

"6. Up-to-date manuals on constitutional diagrams are not available.

The conference has passed the following resolution:

"1. To expand work on constitutional diagrams of metal systems, one must engage the extensive collaboration of the academies of sciences of individual republics, of the affiliates of academies of sciences, and of higher educational institutions.

"2. The organizational committee of the conference should ask the administration of the Institute of Metallurgy to create at this institute a coordination commission for the consideration and coordination of plans dealing with investigations of constitutional diagrams to be conducted in the USSR. The conference charges this coordination commission with the task of approving or disapproving such plans or parts thereof and with making appropriate recommendations on the subject to research organizations.

"3. The organizational committee should advocate before appropriate organizations the publication of a periodical which would cover on an extensive scale theoretical and experimental work done on constitutional diagrams.

"4. One should develop new methods and apply more extensively available methods for the investigation of constitutional diagrams, including the following methods: Differential thermal analysis at 1,500-2,500°, methods of high-temperature X-ray analysis, electronoscopic and electronographic procedures, measurement of vapor pressures and of other thermodynamic values, applications of the drop method, and procedures for spectrochemical analysis at individual points. Extensive work must be conducted on improvement of the equipment and standardization of conditions under which experimental investigations of constitutional diagrams and composition-property diagrams are conducted.

"5. More extensive work should be done on the theory of multicomponent systems and the thermodynamic calculation of constitutional diagrams of binary, ternary, and multicomponent systems.

"6. Work should be expanded on the experimental investigation of the following systems:

"a. Multicomponent systems.

"b. Systems based on titanium and its analogs.

"c. Systems based on heat-resistant metals (chromium, molybdenum, tungsten, and niobium).

"d. Systems based on rare and noble metals (rhenium, palladium, vanadium, rare earth metals, etc.).

"e. Systems based on semiconductor materials.

"f. Systems based on borides, carbides, and silicides.

"g. Systems based on aluminum and magnesium.

"7. The Institute of Scientific Information, Academy of Sciences USSR, should be asked to publish regularly information on the constitutional diagrams of metal systems. The State Publishing House of Theoretical Literature [Gosteoretizdat] should be asked to expedite the publication of manuals on constitutional diagrams of binary systems.

"8. The coordination committee should be asked to consider the question in regard to the expansion of the production of standard equipment to be used in the determination of constitutional diagrams.

"9. To reinforce theoretical and experimental work on constitutional diagrams and improving coordination of work in this field, the administration of the Institute of Metallurgy should be asked to create a division of the investigation of constitutional diagrams."

[For additional information on metallurgy, see Items No 5 and 11.]

IX. PHYSICS

Nuclear Physics

91. Cosmic Ray Study Shows Variance With Hydrodynamical Theory of Particle Production

"Explosion Showers Caused by High-Energy Cosmic Particles," by I. I. Gurevich, A. P. Mishakova, B. A. Nikol'skiy, and L. V. Surkova, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 34, No 2, Feb 58, pp 265-279

Experimental data on and an analysis of 43 cosmic-ray showers caused by 10^{10}-10^{14} ev nucleons and 20 showers caused by particles with $Z \geq 2$ are given. Asymmetry in the angular distribution of shower particles in a center-of-mass system relative to the angle $\pi/2$ was observed in the case of showers caused by particles with energy greater than 10^{11} ev. It is noted that this is not consistent with the picture of shower formation on nuclei in nucleon-nucleon collisions and contradicts the Belen'kiy-Landau hydrodynamic theory of multiple particle formation.

92. Activities at Joint Institute

"City of Friendship," by G. Karnaukh; Moscow, Sovetskaya Rossiya, 1 May 58, pp 2-3

A newspaper article describing the international character of activity at the Joint Institute of Nuclear Research listed the following projects currently being conducted at Dubna, along with some of the scientists working on them:

Study of the theory of elementary particles, by Hu Ning (China) and Ch'ou Kuan-ch'ao (China).

Study of the interaction of high-energy particles, by V. Barashchenkov (USSR), Wang Shu-feng (China), E. Mikhul (Rumania), and P. Markov (Bulgaria).

Development of methods of recording high-energy particles with a luminescence chamber, by G. Tenesesky (Rumania).

Development of a gamma spectrometer to measure the energy of hard electromagnetic radiation, by Yu. Prokoshkin, T'ang Hsiao-wei, Yan Vavra, and A. Sinayev.

Development of an instrument for the automatic examination of nuclear emulsions, by E. Kats (Rumania).

It is noted that gamma spectrometers have not yet been used for the above purpose in laboratories outside the USSR.

93. Hungarian Describes Soviet Joint Atomic Research Institute

"Dubna, Where Mutual Research on Nuclear Secrets is Conducted," by Gyorgy Sarbo; Budapest, Muszaki Elet, No 6, 20 Mar 58, p 2

The Joint Atomic Research Institute at Dubna is a joint establishment of the Soviet Union, China, and the People's Democracies. Scientists of these countries meet regularly at Dubna to exchange experiences and to form work committees for coordinating the assignments to be completed in the individual countries.

Hungarian scientists have participated more than once in the conferences and work committees. Dr Ervin Fenyves, Candiate of Physical Sciences and colleague of the Central Physics Research Institute (Kozponti Fizikai Kutato Intezet), Hungary, recently returned from the latest such conference. He describes the institute at Dubna as follows:

At Dubna, there are two large laboratory complexes consisting of several buildings. The 680-Mev synchrocyclotron which is used to investigate medium-energy nuclear phenomena is located in one complex, and the 10-Bev synchrophasotron for high-energy nuclear research is located a few hundred meters away in the other complex. The two laboratory complexes have a joint theoretical department.

The main building of the first complex consists of three sections. The first section houses the 680-Mev accelerating equipment. The adjoining section contains automatic measuring equipment, and the other instruments are located in the third section. Consequently, the latter can be read even while the accelerator is in operation because they are beyond the sphere of dangerous radiation.

In the first place the reaction of accelerated protons with atomic nuclei is investigated. With the aid of these protons, high-energy neutrons or positive and negative pi-mesons are prepared. Thus the largest synchrocyclotron in the world makes possible the extensive investigation of the properties of protons, neutrons, pi-mesons, and the mu-mesons which originate from the conversion of pi-mesons.

The 10-Bev synchrophasotron, which has a diameter of 60 meters and weighs several thousand tons, is located in the circular main building of the second complex. Here high-energy accelerated protons are investigated, and the production of high-energy neutrons, pi-mesons, k-mesons, hyperons, and antiprotons has been planned.

The investigation of beams of rays is performed in various measuring channels into which the rays have been diverted by powerful magnets. Each channel is fully equipped with measuring instruments, including the diffusion cloud chamber, the photoemulsion register, and various counters such as the scintillometer and the ionization chamber.

A map on the wall of the high-energy laboratory shows the maximum time one can safely spend in various places while the accelerator is in operation. Besides the measuring posts which are protected by concrete walls several meters thick, there are places where one may remain for only a few minutes. Thus the supervisory crew can repair local breakdowns while the accelerator is in operation.

The members of the work committee, continues Fenyves, discussed a uniform procedure for the nuclear-emulsion investigation of particles prepared by the accelerator. According to this, blocks consisting of several hundred photoemulsion plates will be placed into the 10-Bev synchrophasotron in the path of groups of particles. Hungary, too, will receive one or more such blocks. On the individual plates, the path of high-energy particles will be plainly visible, and it will be possible to investigate any nuclear explosions which may have occurred. The researchers on the work committee will process and evaluate the data, collate the results, and publish a joint report.

The other subject of discussion [by the work committee?] was the organization of investigations involving the use of the bubble chamber.

Radiophysics

94. General Solution for Systems With Fluctuating Parameters Given

"On the Problem of Fluctuations of Parameters of Certain Linear Systems," by V. I. Bespalov, Scientific Research Radiophysics Institute at Gorkov State University imeni N. I. Lobachevskiy; Moscow, Doklady Akademii Nauk SSSR, Vol 117, No 2, 11 Nov 57, pp 209-212

A general solution is given for the system of linear difference equations

$$Y_j(n) = A_{jk}(n)\, Y_k(n-1), \quad j,k = 1, 2, \ldots, L$$

whose coefficients are chance fluctuations n. A "comparatively simple" method is given for finding moments and correlation functions. A link of simple Γ-shaped networks and an oscillating circuit with fluctuating parameters are discussed as examples of the method. Other situations mentioned in which the method is applicable are in the study of a filter, the parameters of whose mesh have a certain probability distribution, and in the study of a traveling-wave tube in which a decelerating system with random structural disturbances is used.

Theoretical Physics

95. Expression for "Natural Shape" of Energy Levels Given

"Natural Shape of Energy Levels," by B. I. Stepanov, Academician of the Academy of Sciences Belorussian SSR, and P. A. Apanasevich, Institute of Physics and Mathematics, Academy of Sciences Belorussian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 115, No 3, 21 Jul 57, pp 488-490

An expression is obtained which "may be treated as the natural shape of energy levels." It is noted that "the problem of the shape of levels corresponding to the shape of the natural broadening of spectral lines has seldom been discussed. The ordinary methods of quantum electrodynamics based on the solution of a time equation yield a correct expression for the

shape of spectral lines but do not touch on the question of the broadening of energy levels. It is sometimes assumed that the shape of a spectral line is identically the same as the shape of the excited energy level, but the physical meaning of this is not clear."

The Schroedinger equation for the stationary states of a system consisting of two interacting subsystems, an atom and an electromagnetic field, is solved, and an expression for the shape of a spectral line is derived from the solution.

96. Equations for Flow of Fluid Around Magnetized Bodies Given

"On the Flow of a Fluid Around Magnetized Bodies," by A. G. Kulikovskiy, Moscow State University imeni M. .V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 117, No 2, 11 Nov 57, pp 199-202

The physical situation under consideration is introduced as follows.

"If the conductivity of a fluid is infinite, the oncoming flow, in which a magnetic field is assumed to be absent, cannot penetrate the region occupied by a magnetic field. The magnetic lines of force are 'frozen' in a fluid under infinite conductivity. It follows from this that the region around which flow occurs consists of a magnetized body and a 'cavern,' the region in which the magnetic field is located. This region may be empty or may be filled with fluid. We shall assume for the sake of clarity that the cavern is filled with fluid since the fluid can gradually penetrate the cavern at great conductivity."

The case of steady-state flow is considered, and the fluid is assumed to be at rest inside the cavern. Starting from the equations of magnetohydrodynamics, expressions are derived for the shape of the cavern and for the magnetic field inside it.

Three special cases are discussed: flow of an incompressible fluid around a plane magnetic dipole oriented perpendicular to the flow, supersonic flow around a wedge over whose surface a current of constant density flows paralled to the edge of the wedge, and supersonic flow around a cone over whose surface a current of constant density flows in a direction perpendicular to the generatrix of the cone.

Miscellaneous

97. Extension of Range of Standard Measurements of Ionizing Radiation Under Study

"Metrology Activity in the Field of Ionizing Radiations," by K. K. Aglintsev and A. S. Karamyan, Moscow, Izmeritel'nava Tekhnika, No 6, Nov/Dec 57, pp 85-91

A current problem of the All-Union Scientific Research Institute of Metrology imeni D. I. Mendeleyev (VMIIM) is the production of standard gages and instruments for reproduction of basic units of energy and dose rate of all types of radiation.

At present the following problems in dosimetry and metrology are being worked out.

1. Dosimetry of X and gamma rays in the following range: quantum energy fro 3 kev to 300 Mev; dose rate from 10^{-3} μr/sec to 10^{7} r/sec;

2. Dosimetry of beta rays in the following range: particle energy from 10 kev to 300 Mev; dose rate from 10^{-2} μr/sec to 10^{7} r/sec.

3. Neutron dosimetry in the following range: thermal neutron energy (0.026 ev) to 400-500 Mev; dose rate from 0.1 micro rep/sec to 10^{6} rep/sec.

4. Measurement of alpha activity in the range from 10^{-11} to 10^{2} curies.

5. Measurement of beta activity in the range from 10^{-10} to 10^{3} curies.

6. Measurement of gamma-equivalents in the range from 10^{-9} to 10^{3} gram-equivalents of radium in quantum energies from 200 kev to 3 Mev.

7. Measurement of neutron flux in the range from several neutrons to 10^{14} neutrons/cm sec.

Methods and instruments used to solve the above problem at the institute are described.

98. Czechoslovak Scientific Successes Listed

"The Work Year of Our Scientists" (unsigned article); Prague, Obrana Lidu, 17 Jan 58, p 2

During the past year the institutes, laboratories, and studies of the Czechoslovak Academy of Sciences (Ceskoslovenska akademia ved) solved more than 100 scientific research problems, many of which not only enrich basic scientific concepts, but also promise to be of advantage to the national economy, health, and cultural life.

In mathematical physics exceptional value is attached to the process of preparing semiconductor junctions (polovodicove clanky) for refrigeration purposes, which has been worked out by the Institute of Technical Physics (Ustav technicke fysiky) of the academy. This process makes refrigeration without any machine equipment possible.

In nuclear physics, problems connected with the development of reactors were solved, and a new method of dosimetric protection of workers was originated. From the theoretical viewpoint, special importance is attached to the study of the interaction of high-energy particles which was performed on a nuclear emulsion plate exposed to cosmic radiation. Also, progress was made in physics of solids, where special attention was devoted to semiconductors.

In chemistry the structure of additional substances in the terpene group was solved and research on substances hindering the growth of cancerous tumors was successfully continued.

X. MISCELLANEOUS

99. Underground Irrigation

"Mole-Burrow Type of Underground Irrigation," by V. R. Ridiger; Moscow, Gidrotekhnika i Melioratsya, No 3, Mar 58, pp 30-34

The author describes a cultivating and underground-irrigation-duct-laying plow designated PP-50.

The underground irrigation ducts are made by pulling a string of four cylindrical piercing plugs which gradually enlarge the diameter of the underground duct from 45 mm to 100 mm. These underground irrigation ducts are placed about 500 mm from the surface.

It is believed that such an irrigation system of underground ducts will require only 300-350 cubic meters of water per hectare of irrigated land, as compared with 800-1,000 cubic meters for conventional surface irrigation.

100. Yugoslav Participation in International Scientific Meetings in 1958

"Exchange of Scientific Workers With Poland and the USSR", by H. F.; Belgrade, Borba, 5 Apr 58, p 5

At a meeting of the Academic Council of Yugoslavia (Akademski savet FNRJ) held in Zagreb on 4 April 1958, the question of appointing delegates to international congresses to be held this year was discussed. It was decided that Yugoslav scientists will attend and read papers at ten very important international meetings. Among them are the International Congress of Zoologists to be held in London in July which will be devoted to the celebration of the 100th anniversary of Darwinism, the International Congress of Mathematicians to be held in Edinburgh in August, the International Assembly of Microbiologists to be held in Stockholm in August, the Congress for the History of Medicine to be held in Montpelier in September, and the Congress for Large Electrical Networks to be held in Paris in June.

The Academic Council also discussed the applications of candidates for the exchange of scientists between the academies of sciences of Yugoslavia and the academies of sciences of Poland and of the USSR. Approximately 150 Yugoslavs have applied as candidates for the exchange.

The council also discussed its further activity with respect to the Law on the Organization of Scientific Work (Zakon o organizaciji naucnog rada) which has recently gone into effect.

The council noted with satisfaction the arrival of the well-known Russian parasitologist, Prof K. I. Skryabin, who, at the invitation of the council, will give special lectures for scientists and students in the main university centers of Yugoslavia.

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